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most persons." And even when he is assured that he, too, is a conscious automaton no less than his four-footed companion, he will, I imagine, hesitate to accept this conclusion as the last word of that science which Professor Huxley himself tells him is trained and organised common sense.

In order that we may be in a position to consider how far such rejection of Professor Huxley's carefully reasoned conclusion is justifiable, it will be necessary to quote two or three salient paragraphs in which his view is set forth with his usual lucidity of expression. The following extracts, from the essay in question, will serve to define Huxley's position:

"When we speak of the actions of the lower animals being guided by instinct and not by reason, what we really mean is that, though they feel as we do, yet their actions are the results of their physical organization. We believe, in short, that they are machines, one part of which (the nervous system) not only sets the rest in motion, and coördinates its movements in relation with changes in surrounding bodies, but is provided with special apparatus, the function of which is the calling into existence of those states of consciousness which are termed sensations, emotions, and ideas. I believe that this generally accepted view is the best expression of the facts at present known."[1]

"The consciousness of brutes would appear to be related to the mechanism of their body simply as a collateral product of its working, and to be as completely without any power of modifying that working as the steam whistle which accompanies the work of a locomotive engine is without influence upon its machinery. Their volition, if they have any, is an emotion indicative of physical changes, not a cause of such changes."[1]

"Much ingenious argument has at various times been bestowed upon the question: How is it possible to imagine that volition, which is a state of consciousness, and, as such, has not the slightest community of nature with matter in motion, can act upon the moving matter of which the body is composed, as it is assumed to do in voluntary acts? But if, as is here suggested, the voluntary acts of brutes—or, in other words, the acts which they desire to perform—are as purely mechanical as the rest of their actions, and are simply accompanied by the state of consciousness called volition, the inquiry, so far as they are concerned, becomes superfluous. Their volitions do not enter into the chain of causation of their actions at all.

"It is quite true that, to the best of my judgment, the argumentation which applies to brutes holds equally good of men; and, therefore, that all states of con-

[1] p. 238. [2] p. 240.

sciousness in us, as in them, are immediately caused by molecular changes of the brain substance. It seems to me that in men, as in brutes, there is no proof that any state of consciousness is the cause of change in the motion of the matter of the organism. If these positions are well based, it follows that our mental conditions are simply the symbols in consciousness of the changes which take place automatically in the organism; and that, to take an extreme illustration, the feeling we call volition, is not the cause of a voluntary act, but the symbol of that state of the brain which is the immediate cause of that act. We are conscious automata, endowed with free will in the only intelligible sense of that much-abused term—inasmuch as in many respects we are able to do as we like—but none the less parts of the great series of causes and effects which, in unbroken continuity, composes that which is, and has been, and shall be—the sum of existence."[1]

I take it that Professor Huxley's position, as set forth in the essay from which these passages are quoted, may be summed up in the following propositions:

1. Every movement or molecular change, in the animal body, regarded as a physical occurrence, has a physical antecedent or cause.

2. Certain movements or molecular changes, in the brain or elsewhere, are accompanied by states of consciousness.

3. Such states of consciousness are collateral products which, even if under given conditions they always accompany these changes, serve merely to signify their presence.

4. The term "automaton" is applicable to any piece of mechanism, no matter how complex, all the workings of which at any given time are explicable in terms of physical causation.

5. An animal is such a piece of mechanism some of the physical occurrences in which are accompanied by consciousness as an adjunct.

6. Therefore animals are automata, as above defined.

The first of these propositions may claim, I take it, our unhesitating assent. That every physical occurrence has a physical cause or antecedent, is the fundamental assumption upon which physical science carries on its investigations. So, too, with regard to the second proposition, that certain molecular changes in the brain or elsewhere are accompanied by consciousness. This expresses, in

[1] pp. 243–244.

general terms, the conclusion which physiological psychology tends more and more confidently to endorse. But the third proposition, that consciousness is a collateral product of brain action, introduces a bit of theory which appears to me neither satisfactory nor necessary. I, for one, find as much difficulty in imagining or conceiving how matter in motion can produce consciousness, which, "as such, has not the slightest community of nature with matter in motion," as in conceiving how "volition, which is a state of consciousness, can act upon the moving matter of which the body is composed." The difficulty in each case appears to me to be precisely the same. Moreover, it would seem that each one of us has at least as good reason for believing that one state of consciousness directly suggests another in a chain of psychical causation, as that these conscious states are merely collateral products which symbolise occurrences in a chain of physical causation. Furthermore, the introduction of this piece of theory is unnecessary so far as the present discussion is concerned. The facts, or what we believe to be the facts, are just as well expressed by saying that, from one point of view, certain physical occurrences have conscious concomitants, and that, from another point of view, certain conscious occurrences have physical concomitants; and that, from either point of view, these occurrences are links in a causation chain. This leaves Huxley's main contention exactly where it was. It merely strikes out a redundant hypothesis.

We come now to the fourth proposition. Professor Huxley does not, indeed, anywhere define the terms "automaton" and "automatism"; but the definition above given, that the term "automaton" is applicable to any piece of mechanism all the workings of which at any given time are explicable in terms of physical causation, may, I think, be fairly inferred from what is explicitly or implicitly contained in the essay. And this is no doubt in accord with such a definition as that given in the Encyclopædia Britannica, where an automaton is described as "a self-moving machine, or one in which the principle of motion is contained within the mechanism itself." It is true that we are told that "the word is generally applied to contrivances which simulate for a time the motions of ani-

mal life." But if we apply it to *any* of the motions of animal life, there would appear to be no logical grounds for rejecting its application to *all* these motions. And if we accept these definitions as they stand, Huxley's position, as summarised in propositions 5 and 6, follow in logical sequence, and we must hold with him that in the life of animals and man automatism reigns supreme.

We may fairly ask, however, first, whether the definition, so applied, is in accordance with general usage; secondly, whether it is helpful in the study of animal life; and, thirdly, whether it preserves the spirit of the teaching of that acute thinker, René Descartes, whose thought Professor Huxley interpreted in terms of modern science.

It certainly does not appear to be in accordance with common usage. When I receive a telegram from a friend, who has recently returned to England, begging me to come and see him, and deliberate whether, in view of certain engagements into which I have entered, I can accede to his request, it would seem to be scarcely in accordance with established usage to say that I fill in the reply-telegram automatically. Nor would most persons, I imagine, describe my action as instinctive, as they should do if Huxley's view be accepted in its entirety, and if, "when we speak of the actions of the lower animals being guided by instinct, . . . what we really mean is that, though they feel as we do, yet their actions are the results of their physical organisation." For the words which Professor Huxley inserts after instinct—"are guided by instinct and not by reason"—may be omitted if reason, too, like volition, be no less than reflex action, "one of the results of our physical organisation." Nor, again, is it in accordance with established usage to call a being which profits by experience and which is susceptible of progressive education an automaton.

To the second question, as to the first, I am disposed to give a negative answer. Distinctive terms are of service just in so far as they help us to draw the distinctions which are necessary for clearness of thought and expression. If we universalise the term automatism so as to comprise the whole active life of man and animals, it loses all its distinctive value. The term as applied to animal life

is useful just in so far as it serves to distinguish actions which are automatic from others which are not automatic. On these grounds, I am prepared to advocate a more restricted definition, according to which an automatic action is one that we have reason to suppose is not performed under the immediate guidance of consciousness, this phrase being understood to be a shortened expression for "with the intervention of certain controlling physical occurrences which are accompanied by states of consciousness." Of the exact nature and sequence of these physical occurrences, we are at present profoundly ignorant; but of the nature and sequence of the states of consciousness as they occur in ourselves, we do, at any rate, know something. And we may fairly infer the existence of somewhat similar states from the observable behavior of animals.

But does Professor Huxley's position preserve the spirit of the teaching of Descartes? I venture to think not. Huxley himself, in an earlier essay—that on "Descartes's Discourse on Method"—thus briefly indicates the Cartesian conception of the rôle of consciousness:

"According to Descartes all the functions which are common to man and animals are performed by the body as a mere mechanism, and he looks upon consciousness as the peculiar distinction of the '*chose pensante*,' of the 'rational soul,' which in man (and in man only in Descartes's opinion) is superadded to the body. This rational soul he conceived to be lodged in the pineal gland as in a sort of central office; and here, by the intermediation of the animal spirits, it became aware of what was going on in the body, or influenced the operations of the body. Modern physiologists do not ascribe so exalted a function to the little pineal gland, but, in a vague sort of way, they adopt Descartes's principle, and suppose that the soul is lodged in the cortical part of the brain—at least this is commonly regarded as the seat and instrument of consciousness."[1]

Now what is the essential feature of Descartes's conception of the part played by consciousness? Is it not that that which controls, stands apart from the automatic mechanism over which its control is exercised? It is true that his enthronement of consciousness in the pineal body was about as wide of the mark as was his

[1] *Collected Essays*, Vol. I., Essay IV., pp. 188-189.

conception of the nerves as conduit pipes through which the animal spirits, pumped from the heart to the brain, are emptied into the muscles. But if in the latter case his principles were sound, though his facts were conjectural, so, too, in the former case, his conception was valid in essence though his pineal gland took no share in its elaboration. And one may be permitted to wonder in what manner, "unwearied dissector and observer" as he was, Descartes regarded the pineal body in the animals he dissected and observed. Was it an empty throne awaiting its royal occupant? This, however, by the way. The essential feature of his teaching, as I understand it, is that when, as in the actions of man, we have evidence of guidance and control, in view of certain data afforded to consciousness, that which guides and controls stands apart from the bodily mechanism concerned in merely automatic response. Descartes himself believed that the soul, enthroned in the pineal gland, performed this function. Later thinkers have believed that the soul used the cerebral cortex as the instrument through which its control was exercised. Professor Huxley, wielding the sword of logic, forces the soul to abdicate its throne, and by his extended hypothesis of automatism does away altogether with the conception of guidance and control. But if we dethrone the soul, and deny its divine right to rule our actions, that is no reason why we should leave the body politic without any form of government. The truer inference is that the cerebral cortex is the organ of control not as the instrument of the soul, (which may or may not exist,[1] so far as the matters we are discussing are concerned,) but in its own right. For the cortex itself stands apart from the lower brain-centres which are concerned in automatism in the more restricted sense.[2] The cortex is not the instrument of that which controls, but *is*, from the physical point of view, that which controls. The molecular changes therein, evoked by bodily conditions, are such as to augment, or inhibit (and by augmenting here

[1] This I conceive to be the rigidly agnostic position.

[2] "The cerebral hemispheres, as we have more than once insisted, seem to stand apart from the rest of the brain." Professor M. Foster, *Text-book of Physiology*, 5th Edition, Part III., p. 999.

and inhibiting there to modify[1]) the action of the lower automatic centres; and these molecular changes are accompanied by consciousness. The physiology of the future may be able to indicate the physical conditions under which control is effected; but as matters now stand, we know far more about the accompaniments in consciousness than we do about the concomitant molecular changes. In describing therefore what we believe to occur, we may say, if we desire to be somewhat pedantically accurate, that the actions which we term voluntary are the effects of those molecular changes in the cortex which are accompanied by consciousness; or we may say in brief and to avoid circumlocution, that they are the results of conscious guidance and control. Thus we preserve the essence of Descartes's teaching but interpret it in terms of modern scientific thought.

On all grounds, then, a more restricted definition of the term "automaton" than that which Professor Huxley adopted in his later Essay[2] seems advisable; on the ground of general usage, on the ground of scientific utility, and on the ground of historical precedent. And our consideration of Descartes's teaching helps us to reach a further definition of animal automatism, in the more restricted sense. Automatic action is that which is performed without the immediate and effective intervention of those molecular changes in the cerebral cortex which are accompanied by consciousness (such intervention being rendered possible by association); or, in brief, automatic action is that which is performed without conscious guidance and control. Consciousness as an adjunct there may be; but it takes no share in the direction of active response.

Professor Huxley returns to the subject of animal automatism in a subsequent essay—that on *The Connection of the Biological Sci-*

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[1] Descartes used similar expressions when he likened the rational soul to the engineer amidst the automatic figures of a grotto "when he wishes to increase, or to slacken, or in some way to alter their movements." Quoted by Huxley, *Collected Essays*, Vol. I., Essay IV., p. 183.

[2] In his earlier essay on Descartes's Discourse he seems to accept the more restricted usage. See his remarks on the effects of education by which acts become mechanical. *Loc. cit.*, p. 188. See also the sentences at the top of p. 187.

ences with Medicine[1] (1881)—and indicates certain modifications of Descartes's views which more recent biological conceptions had seemingly rendered necessary. He says:[2]

"But though, as I think, there is no doubt that Descartes was the first to propound the fundamental conception of the living body as a physical mechanism, which is the distinctive feature of modern, as contrasted with ancient physiology, he was misled by the natural temptation to carry out, in all its details, a parallel between the machines with which he was familiar, such as clocks and pieces of hydraulic apparatus, and the living machine. In all such machines there is a central source of power, and the parts of the machine are merely passive distributors of that power. The Cartesian school conceived of the living body as a machine of that kind."

Professor Huxley then leads up to the modern conception of the animal body as constituted by a multitude of cell-units, together with certain of their products; and quotes from Bichat the following intermediate conception:

"All animals," says Bichat, "are assemblages of different organs, each of which performs its function and concurs, after its fashion, in the preservation of the whole. They are so many special machines in the general machine which constitutes the individual. But each of these special machines is itself compounded of many tissues of very different natures, which in truth constitute the elements of these organs."[3]

In view of this conception of the body as a complex structure composed of special organs and tissues, supplemented by the more recent conception of the tissues themselves as constituted of cellular units, Descartes's views stand in need of restatement, and Huxley thus indicates the nature of the modification required:

"The proposition of Descartes that the body of a living man is a machine, the actions of which are explicable by the known laws of matter and motion, is," he says, "unquestionably largely true. But it is also true, that the living body is a synthesis of innumerable physiological elements [the cell-units], each of which [is] susceptible of structural metamorphosis and functional metabolism: and that the only machinery, in the precise sense in which the Cartesian school understood mechanism, is that which co-ordinates and regulates these physiological units into an organic whole."[4]

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[1] *Collected Essays*, Vol. III., pp. 350 et. seq. [2] *Loc. cit.*, pp. 362–363.
[3] *Loc. cit.*, p. 367. [4] *Loc. cit.*, pp. 368–369.

Huxley then proceeds to show that, with regard to the action of the living protoplasm of the cell unit, physiologists fall into two schools. First, those "who look with as little favor as Bichat did upon any attempt to apply the principles and the methods of physics and chemistry to the investigation of the vital processes of growth, metabolism, and contractility;" and secondly, those who "look to molecular physics to achieve the analysis of living protoplasm itself into a molecular mechanism." And he himself accepts the latter alternative. "Living matter," he says, "differs from other matter in degree and not in kind; the microcosm repeats the macrocosm; and one chain of causation connects the nebulous original of suns and planetary systems with the protoplasmic foundation of life and organisation."[1]

So far good. Professor Huxley, however, does not proceed, with his accustomed thoroughness, to exhibit the connexion of this conception of cellular automatism with the modified Cartesian view, according to which, he says, the only machinery is that which coordinates and regulates these physiological units into an organic whole. I may perhaps be permitted to do so in terms of that restricted automatism which I am here advocating.

Every cell may be regarded as a minute machine specially fitted to produce certain chemical products or to undergo certain physical changes under the conditions which obtain in the living body. Groups of these minute cellular machines constitute tissues and organs in which their joint and related activities are effectively combined. The organ thus forms a composite machine; and its products or its physical changes are the net result of the mechanical transactions in the cell units of which it is constituted. And the machine is an automatic one in the sense that every physical change which occurs therein has physical antecedents or causes. But it also presents this peculiarity; that the structure of the machine is modified by its functional activity; that it is to some extent a plastic machine which is moulded to its work by the performance of that work. So that if we speak of it as a piece of automatic mechanism

[1] *Loc. cit.*, pp. 370–371.

we must remember that its automatism is, within certain limits, capable of adaptive modification; that there is in addition to automatic performance and automatic adjustment something more, namely adaptation to new conditions. Whether it is well to apply the term "automatic" to such adaptation is a matter that is open to discussion. The conception of automatism carries with it, for me, an idea of relative fixity and invariability with which the idea of plasticity and adaptation is incongruous; and I should myself prefer to say that organic adaptation to environing conditions is something beyond and superadded to automatism.

We must in any case distinguish between the multifarious molecular processes which occur in muscular and glandular tissues and the co-ordinating processes which occur in nervous centres, and which serve to give unity to the working of the compound mechanism of the body at large. It is here that we find that machinery, "in the precise sense in which the Cartesian school understood mechanism," which regulates the activities of the physiological units and co-ordinates them into an organic whole. But there are two distinct types of the regulative process involved in this co-ordination; the one characterised by relative fixity and invariability; the other characterised by relative plasticity and adaptation. It is to the former that the term animal automatism is, I conceive, properly applicable. It comprises that co-ordination which is seen in reflex action and in instinctive response. It involves no intervention of conscious guidance and control. In so far as it is subject to modification it ceases to be automatic in character. Strongly contrasted with this type of regulative co-ordination is that which gives plasticity to the organism as a whole. It comprises that co-ordination which is seen in voluntary action and renders acquisition possible. It exercises a more or less modifying influence on instinctive responses and thus lifts them above the level of automatism. It involves the direct intervention of those molecular cortical processes which have for their conscious concomitants what we term choice, based on previous individual experience and dependent upon the association of impressions and ideas.

On this view an intelligent (and still more a rational) automa-

ton is a contradiction in terms. Intelligence takes in hand the automatism presented through heredity, modifies it, and, in the early days of life drills the activities and reorganises them into habits.

When a drill-sergeant takes in hand a number of raw recruits he has to keep a vigilant eye on all their actions, checking useless, misguided, or mistaken activity in this direction, eliciting more prompt and more vigorous response to his commands in that direction; making his men act not as isolated units but as constituent members of a corporate body, and aiming throughout at that coordinated action on which their future efficiency will depend; so that, when they take their places in the ranks, each may be ready to perform his own part, in due subordination to the combined action of the whole, without faltering and without hesitation. The men are duly organised into squads, companies, battalions, and so on; and thus we have a disciplined army with its brigades, divisions, and army corps; with its artillery, engineers, cavalry, and infantry; with its staff divided into intelligence, commissariat, and medical departments, each with distinctive responsibilities and under its own especial commanding officers; the whole capable of the most varied and yet most orderly evolutions at the will of the commander-in-chief.

It is the function of consciousness, represented in the flesh by the cerebral cortex, to drill and organise the active forces of the animal body in a somewhat analogous manner. But when it enters upon its duties consciousness finds that a considerable amount of the drilling has already been done for it. There is no need to teach the organic mechanism how certain activities are to be performed. They are already carried out automatically. The intelligence department, with its special senses and so forth, is already organised so far as the supply of information is concerned. The commissariat department, digestive organs, heart, lungs, and the rest, is in pretty good working order and eagerly on the look-out for supplies. Many complex activities, adaptive actions of the reflex kind and of the type termed instinctive, are at once performed without the guidance of consciousness under appropriate conditions. Consciousness merely looks on and makes a memorandum of what is going for-

ward. The number and the complexity of those instinctive activities that consciousness thus finds ready to its hand varies in the different grades of animal life; being at a maximum in such forms as insects and spiders; being more marked in birds than in mammals; and being inconspicuous or difficult to trace in man. There are, however, also many more or less isolated activities, with very little initial adaptive value, which resemble raw recruits. Such are the comparatively aimless and random limb-movements of the human infant, as he lies helpless on his mother's lap. Consciousness has to lick these into shape; to combine and organise their vague efforts in directions that are useful for the purposes of animal life, and adapted to the conditions under which the forces of that life are employed; gradually to bring the effective work done by the several companies, represented by groups of muscles, into due relation to each other; and to assume the supreme command of all the forces and thus to carry on the battle of life at the best advantage.

Such an analogy as this must not be pressed too far. It is adduced merely for the purposes of illustration. The drill-sergeant, for example, is dealing with intelligent beings themselves capable of directing and controlling their own actions. But consciousness as a drill-sergeant is dealing with automatic movements or activities, instinctive or random as the case may be, themselves incapable of self-guidance. What the analogy here serves to illustrate is this, that neither the drill-sergeant, on the one hand, nor consciousness, on the other hand, can directly produce the activities which are dealt with. The activities must be given. The utmost that can be done is to stimulate some to increased energy of action and to check or repress others. The activities cannot be created or produced: they can only be educed or reduced. Secondly, just as the drill-sergeant must vigilantly watch his men, since he is dependent on such observation for information as to the correct performance of their actions; so, too, is consciousness entirely dependent on the information received through the incoming channels or afferent nerves for the data upon which its guidance, through the exercise of its power of augmentation, and inhibition, is based. Thirdly,

just as the superior officer has to bring into due relation the evolutions which are carried out under the control of his subordinates, so does consciousness correlate the data received through many groups of different nerves and co-ordinate a number of varied activities into a more or less definite course of behavior. It is true that the analogy here again, to some extent, fails us, since the drill-sergeant and his superior officer are separate individuals, while consciousness is continuous and is drill-sergeant and superior officer rolled into one. But, though this continuity of consciousness remains unbroken, we have abundant evidence, in the course of our own experience, of the fact that, during the gradual establishment of the supreme conscious control of the bodily activities, the regulation of details of active response is, step by step, relegated to subconscious guidance, which, though constantly in touch with, requires but little attention from, the supreme centres of voluntary control. The horseman, the cyclist, the pianist, knows well that, when once skill has been attained, such further guidance as is required under the special conditions of any particular performance of the act of skill may be safely left to subconsciousness, scarcely troubling the attention at all. Habit has, in large degree, rendered these actions part of the acquired automatism. But consciousness, like a wise superior officer, still keeps vigilant watch. So long as the performance is satisfactory and accurate the superior officer sees as if he saw not; but when anything goes wrong, consciousness, as superior officer, steps in more or less smartly and decisively.

Few are likely to question the importance in animal life of the acquisition of habits, including, as we must, under this term, nearly all the varied forms of animal skill. For even when the skill is founded upon a congenital and instinctive basis, it is (except, perhaps, in some instinctive activities of insects and other invertebrates) improved and guided to finer and more delicate issues in the course of individual experience. So that we may regard the function of consciousness as twofold; first, it is concerned in the establishment of habits; and, secondly, it is concerned in the utilisation of all the active powers, including the habits so established, in meeting the varied requirements of daily life.

How, then, we may proceed to ask, is the guidance of consciousness effected? Upon what principles are the acquisition of skill and the utilisation of skill to be explained?

There can be no question that, from the psychological point of view, the association of impressions and ideas is of fundamental importance. Whatever may be the position assigned to so-called "association by contiguity" in human psychology, there can be no question as to its essential importance in the more primitive psychology of such animals as young birds and young mammals. When chicks learn rapidly to distinguish between the caterpillars of the cinnabar moth and those of the cabbage moth, so that they gobble up the one without hesitation and avoid the other without fail, they give us the plainest intimation which can be conveyed by objective signs that an association has been formed in either case between appearance and taste. Professor Preyer notes that his chicks rapidly learnt to associate the sound of tapping with the presence of food. I have elsewhere described how one of my chicks which had but recently learnt to drink standing in its tin, subsequently stopped as it ran through the water in such a way as to lead one to infer that the wet feet had become associated with the satisfaction of thirst. Young pheasants seemed to associate water with the sight of a toothpick on which I gave them drops. Ducklings so thoroughly associated water with the sight of their tin that they tried to drink from it and wash in it, though it was empty, nor did they desist for some minutes. A young moor-hen, for whose benefit we had dug up worms with a spade, and which, standing by, jumped on the just-turned sod and seized every wriggling speck which caught his keen eye, would soon run from some distance to me so soon as I took hold of the spade. There is no need to multiply instances of this kind. The study of these young birds is an impressive lesson in association psychology, and one daily grows more convinced of the importance of association in the acquisition of experience of this homely elementary but essentially practical kind.

But it may be said that though association is unquestionably important, yet its efficiency in the guidance of action depends upon something deeper still. Granted that, in a chick which has

first seen and then tasted a nasty morsal, an association is formed between sight and taste, so that on a subsequent occasion its peculiar appearance suggests its peculiar nastiness. What is the connexion between the nastiness of a cinnabar caterpillar and the checking of the tendency to eat it, or between the niceness of a cabbage moth caterpillar and the added energy with which it is seized? Why do taste-stimuli of one kind have the one effect and taste-stimuli of a different kind have just the opposite effect? What are the physiological concomitants of the augmentation of response in the one case and of the inhibition of response in the other case? I conceive that there is but one honest answer to these questions. We do not know. This and much beside must be left for the physiology of the future to explain. This much may be said: Certain stimuli call forth cortical disturbances, the result of which is the inhibition of activities leading to the repetition of these stimuli; certain others call forth cortical disturbances the result of which is the augmentation of the activities which lead to their repetition. The accompaniments in consciousness of the latter we call pleasurable; the accompaniments in consciousness of the former we call unpleasant, distasteful, or painful. That appears to be a plain statement of the facts as we at present understand them.

Now there can be no question as to the strongly-marked hereditary element in such augmentation of response when the cortical disturbances have pleasurable concomitants and the inhibition of response when the cortical disturbances have unpleasant concomitants. This is, in fact, grounded on the innate powers or faculties which the organism derives from its parents or more distant ancestors. But if the cortical augmentation and inhibition form the basis upon which all acquisition and all control are based, what becomes of the distinction between instinctive and acquired activities? What of that between automatic and controlled behavior? Do we not come back, after all, to the universal automatism advocated by Professor Huxley?

Let us look again at the facts. A chick sees for the first time in its life a cinnabar caterpillar, instinctively pecks at it under the influence of the visual stimulus; seizes it, and instinctively shrinks

under the influence of the taste stimulus. So far we have instinct and automatism. Presently we throw to it another similar caterpillar. Instinct and automatism alone would lead to a repetition of the previous series of events—seeing, seizing, tasting, shrinking. The oftener the experiment was performed the more smoothly would the organic mechanism work, the more definitely would the same sequence be repeated—seeing, seizing, tasting, shrinking. Is this what we actually observe? Not at all. On the second occasion the chick acts differently as the result of the previous experience. Though he sees, he does not seize, but shrinks without seizing. We believe that there is a revival in memory of the nasty taste. And in this we seem justified, since we may observe that sometimes the chick, on such occasions, wipes its bill on the ground as he does when he experiences an unpleasant taste, though he has not touched the larva. The chick, then, does not continue to act merely from instinct and like an automaton. His behavior is modified in the light of previous experience. What, then, has taken place in and through which this modification, born of experience, is introduced? In answering this question we seem to put our finger upon that in virtue of which the distinction now regarded as of so much biological significance—that between congenital and acquired activities—has a valid existence. The answer may be given in two words—*Association* and the *Suggestion* that arises therefrom. The chick's first experience of the cinnabar caterpillar leads to an association between the appearance of the larva and its taste; or, from the physiological point of view, a direct connexion between the several cortical disturbances. On the second occasion the taste is suggested by the sight of the cinnabar larva; or, physiologically, the disturbance associated with taste is directly called forth by the disturbance associated with sight. It is through association and suggestion that an organism is able to profit by experience and that its behavior ceases to be merely instinctive and automatic. And such association would seem to be a purely individual matter—founded, no doubt, on an innate basis, linking activities of the congenital type, but none the less wholly dependent upon the immediate touch of individual experience.

In watching, then, the behavior of young birds or other animals, we observe a development which we interpret as the result of conscious choice and selection. For the chick, to which a handful of mixed caterpillars is thrown, chooses out the nice ones and leaves the nasty ones untouched. The selection is dependent upon an innate power of association which needs the quickening touch of individual experience to give it activity and definition, without which it lies dormant as a mere potentiality. On this conscious selection and choice depends throughout its entire range this development of those habits which are acquired as opposed to those which are congenital; and on it depends the whole of mental as contrasted with merely biological evolution. On it, too, depends the distinction between animal automatism, in the restricted sense here advocated, and those higher powers which, though founded thereon, constitute a new field of evolutionary progress.

C. LLOYD MORGAN.

THE REGENERATED LOGIC.

THE appearance of Schroeder's *Exact Logic*[1] has afforded much gratification to all those homely thinkers who deem the common practice of designating propositions as "unquestionable," "undoubtedly true," "beyond dispute," etc., which are known to the writer who so designates them to be doubted, or perhaps even to be disputed, by persons who with good mental capacities have spent ten or more years of earnest endeavor in fitting themselves to judge of matters such as those to which the propositions in question relate, to be no less heinous an act than a trifling with veracity, and who opine that questions of logic ought *not* to be decided upon philosophical principles, but on the contrary, that questions of philosophy ought to be decided upon logical principles, these having been themselves settled upon principles derived from the only science in which there has never been a prolonged dispute relating to the proper objects of that science. Among those homely thinkers the writer of this review is content to be classed.

Why should we be so much gratified by the appearance of a single book? Do we anticipate that this work is to convince the philosophical world? By no means; because we well know that prevalent philosophical opinions are not formed upon the above principles, nor upon any approach to them. A recent little paper by an eminent psychologist concludes with the remark that the ver-

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[1] *Vorlesungen über die Algebra der Logik* (Exakte Logik). Von Dr. Ernst Schröder, Ord. Professor der Mathematik an der technischen Hochschule zu Karlsruhe in Baden. Dritter Band. *Algebra und Logik der Relative.* Leipsic: B. G. Teubner. 1895. Price, 16 M.

dict of a majority of four of a jury, provided the individual members would form their judgments independently, would have greater probability of being true than the unanimous verdict now is. Certainly, this may be assented to; for the present verdict is not so much an opinion as a resultant of psychical and physical forces. But the remark seemed to me a pretty large concession from a man imbued with the idea of the value of modern opinion about philosophical questions formed according to that scientific method which the Germans and their admirers regard as the method of modern science,—I mean, that method which puts great stress upon co-operation and solidarity of research even in the early stages of a branch of science, when independence of thought is the wholesome attitude, and gregarious thought is really sure to be wrong. For, as regards the verdict of German *university professors*, which, excepting at epochs of transition, has always presented a tolerable approach to unanimity upon the greater part of fundamental questions, it has always been made up as nearly as possible in the same way that the verdict of a jury is made up. Psychical forces, such as the spirit of the age, early inculcations, the spirit of loyal discipline in the general body, and that power by virtue of which one man bears down another in a negotiation, together with such physical forces as those of hunger and cold, are the forces which are mainly operative in bringing these philosophers into line; and none of these forces have any direct relation to reason. Now, these men write the larger number of those books which are so thorough and solid that every serious inquirer feels that he is obliged to read them; and his time is so engrossed by their perusal that his mind has not the leisure to digest their ideas and to reject them. Besides, he is somewhat overawed by their learning and thoroughness. This is the way in which certain opinions—or rather a certain verdict—becomes prevalent among philosophical thinkers everywhere; and reason takes hardly the leading part in the performance. It is true, that from time to time, this prevalent verdict becomes altered, in consequence of its being in too violent opposition with the changed spirit of the age; and the logic of history will usually cause such a change to be an advance toward truth in some respect. But this process is so slow, that it

is not to be expected that any rational opinion about logic will become prevalent among philosophers within a generation, at least.

Nevertheless, hereafter, the man who sets up to be a logician without having gone carefully through Schroeder's Logic will be tormented by the burning brand of *false pretender* in his conscience, until he has performed that task; and that task he cannot perform without acquiring habits of exact thinking which shall render the most of the absurdities which have hitherto been scattered over even the best of the German treatises upon logic impossible for him. Some amelioration of future treatises, therefore, though it will leave enough that is absurd, is to be expected; but it is not to be expected that those who form their opinions about logic or philosophy rationally, and therefore not gregariously, will ever comprise the majority even of philosophers. But opinions thus formed, and among such those formed by thoroughly informed and educated minds, are the only ones which need cause the homely thinker any misgiving concerning his own.

It is a remarkable historical fact that there is a branch of science in which there has never been a prolonged dispute concerning the proper objects of that science. It is the mathematics. Mistakes in mathematics occur not infrequently, and not being detected give rise to false doctrine, which may continue a long time. Thus, a mistake in the evaluation of a definite integral by Laplace, in his *Mécanique céleste*, led to an erroneous doctrine about the motion of the moon which remained undetected for nearly half a century. But after the question had once been raised, all dispute was brought to a close within a year. So, several demonstrations in the first book of Euclid, notably that of the 16th proposition, are vitiated by the erroneous assumption that a part is necessarily less than its whole. These remained undetected until after the theory of the non-Euclidean geometry had been completely worked out; but since that time, no mathematician has defended them; nor could any competent mathematician do so, in view of Georg Cantor's, or even of Cauchy's discoveries. Incessant disputations have, indeed, been kept up by a horde of undisciplined minds about quadratures, cyclotomy, the theory of parallels, rotation, attraction, etc. But the disputants

are one and all men who cannot discuss any mathematical problem without betraying their want of mathematical power and their gross ignorance of mathematics at every step. Again, there have been prolonged disputes among real mathematicians concerning questions which were not mathematical or which had not been put into mathematical form. Instances of the former class are the old dispute about the measure of force, and that lately active concerning the number of constants of an elastic body; and there have been sundry such disputes about mathematical physics and probabilities. Instances of the latter class are the disputes about the validity of reasonings concerning divergent series, imaginaries, and infinitesimals. But the fact remains that concerning strictly mathematical questions, and among mathematicians who could be considered at all competent, there has never been a single prolonged dispute.

It does not seem worth while to run through the history of science for the sake of the easy demonstration that there is no other extensive branch of knowledge of which the same can be said.

Nor is the reason for this immunity of mathematics far to seek. It arises from the fact that the objects which the mathematician observes and to which his conclusions relate are objects of his mind's own creation. Hence, although his proceeding is not infallible,—which is shown by the comparative frequency with which mistakes are committed and allowed,—yet it is so easy to repeat the inductions upon new instances, which can be created at pleasure, and extreme cases can so readily be found by which to test the accuracy of the processes, that when attention has once been directed to a process of reasoning suspected of being faulty, it is soon put beyond all dispute either as correct or as incorrect.

Hence, we homely thinkers believe that, considering the immense amount of disputation there has always been concerning the doctrines of logic, and especially concerning those which would otherwise be applicable to settle disputes concerning the accuracy of reasonings in metaphysics, the safest way is to appeal for our logical principles to the science of mathematics, where error can only long go unexploded on condition of its not being suspected.

This double assertion, first, that logic ought to draw upon

mathematics for control of disputed principles, and second that ontological philosophy ought in like manner to draw upon logic, is a case under a general assertion which was made by Auguste Comte, namely, that the sciences may be arranged in a series with reference to the abstractness of their objects; and that each science draws regulating principles from those superior to it in abstractness, while drawing data for its inductions from the sciences inferior to it in abstractness. So far as the sciences can be arranged in such a scale, these relationships must hold good. For if anything is true of a whole genus of objects, this truth may be adopted as a principle in studying every species of that genus. While whatever is true of a species will form a datum for the discovery of the wider truth which holds of the whole genus. Substantially the following scheme of the sciences is given in the *Century Dictionary*:

MATHEMATICS

Philosophy { Logic / Metaphysics.

Science of Time	Geometry	
Nomological Psychics	Nomological Physics	Molar / Molecular / Ethereal
Classificatory Psychics	Classificatory Physics	Chemistry / Biology, or the chemistry of protoplasms
Descriptive Psychics	Descriptive Physics	

PRACTICAL SCIENCE.

Perhaps each psychical branch ought to be placed above the corresponding physical branch. However, only the first three branches concern us here.

Mathematics is the most abstract of all the sciences. For it makes no external observations, nor asserts anything as a real fact. When the mathematician deals with facts, they become for him mere "hypotheses"; for with their truth he refuses to concern himself. The whole science of mathematics is a science of hypotheses; so that nothing could be more completely abstracted from concrete reality. Philosophy is not quite so abstract. For though it makes no *special* observations, as every other positive science does, yet it does deal with reality. It confines itself, however, to the universal

phenomena of experience; and these are, generally speaking, sufficiently revealed in the ordinary observations of every-day life. I would even grant that philosophy, in the strictest sense, confines itself to such observations as *must* be open to every intelligence which can learn from experience. Here and there, however, metaphysics avails itself of one of the grander generalisations of physics, or more often of psychics, not as a governing principle, but as a mere datum for a still more sweeping generalisation. But logic is much more abstract even than metaphysics. For it does not concern itself with any facts not implied in the supposition of an unlimited applicability of language.

Mathematics is not a positive science; for the mathematician holds himself free to say that A is B or that A is not B, the only obligation upon him being, that as long as he says A is B, he is to hold to it, consistently. But logic begins to be a positive science; since there are some things in regard to which the logician is not free to suppose that they are or are not; but acknowledges a compulsion upon him to assert the one and deny the other. Thus, the logician is forced by positive observation to admit that there is such a thing as doubt, that some propositions are false, etc. But with this compulsion comes a corresponding responsibility upon him not to admit anything which he is not forced to admit.

Logic may be defined as the science of the laws of the stable establishment of beliefs. Then, *exact* logic will be that doctrine of the conditions of establishment of stable belief which rests upon perfectly undoubted observations and upon mathematical, that is, upon *diagrammatical*, or, *iconic*, thought. We, who are sectaries of "exact" logic, and of "exact" philosophy, in general, maintain that those who follow such methods will, so far as they follow them, escape all error except such as will be speedily corrected after it is once suspected. For example, the opinions of Professor Schröder and of the present writer diverge as much as those of two "exact" logicians well can; and yet, I think, either of us would acknowledge that, however serious he may hold the errors of the other to be, those errors are, in the first place, trifling in comparison with the original and definite advance which their author has, by the

"exact" method, been able to make in logic, that in the second place, they are trifling as compared with the errors, obscurities, and negative faults of any of those who do not follow that method, and in the third place, that they are chiefly, if not wholly, due to their author not having found a way to the application of diagrammatical thought to the particular department of logic in which they occur.

"Exact" logic, in its widest sense, will (as I apprehend) consist of three parts. For it will be necessary, first of all, to study those properties of beliefs which belong to them as beliefs, irrespective of their stability. This will amount to what Duns Scotus called *speculative grammar*. For it must analyse an assertion into its essential elements, independently of the structure of the language in which it may happen to be expressed. It will also divide assertions into categories according to their essential differences. The second part will consider to what conditions an assertion must conform in order that it may correspond to the "reality," that is, in order that the belief it expresses may be stable. This is what is more particularly understood by the word *logic*. It must consider, first, *necessary*, and second, *probable* reasoning. Thirdly, the general doctrine must embrace the study of those general conditions under which a problem presents itself for solution and those under which one question leads on to another. As this completes a triad of studies, or trivium, we might, not inappropriately, term the last study *Speculative rhetoric*. This division was proposed in 1867 by me, but I have often designated this third part as *objective logic*.

Dr. Schröder's Logic is not intended to cover all this ground. It is not, indeed, as yet complete; and over five hundred pages may be expected yet to appear. But of the seventeen hundred and sixty-six pages which are now before the public, only an introduction of one hundred and twenty-five pages rapidly examines the speculative grammar, while all the rest, together with all that is promised, is restricted to the deductive branch of logic proper. By the phrase "exact logic" upon his title-page, he means logic treated algebraically. Although such treatment is an aid to exact logic, as defined on the last page, it is certainly not synonymous with it. The principal utility of the algebraic treatment is stated

by him with admirable terseness: it is "to set this discipline free from the fetters in which language, by force of custom, has bound the human mind." Upon the algebra may, however, be based a calculus, by the aid of which we may in certain difficult problems facilitate the drawing of accurate conclusions. A number of such applications have already been made; and mathematics has thus been enriched with new theorems. But the applications are not so frequent as to make the elaboration of a facile calculus one of the most pressing desiderata of the study. Professor Schröder has done a great deal in this direction; and of course his results are most welcome, even if they be not precisely what we should most have preferred to gain.

The introduction, which relates to first principles, while containing many excellent observations, is somewhat fragmentary and wanting in a unifying idea; and it makes logic too much a matter of feeling. It cannot be said to belong to exact logic in any sense. Thus, under β (Vol. I., p. 2) the reader is told that the sciences have to suppose, not only that their objects really exist, but also that they are knowable and that for every question there is a true answer and but one. But, in the first place, it seems more exact to say that in the discussion of one question nothing at all concerning a wholly unrelated question can be implied. And, in the second place, as to an inquiry presupposing that there is some one truth, what can this possibly mean except it be that there is one destined upshot to inquiry with reference to the question in hand,—one result, which when reached will never be overthrown? Undoubtedly, we hope that this, *or something approximating to this*, is so, or we should not trouble ourselves to make the inquiry. But we do not necessarily have much confidence that it *is* so. Still less need we think it is so about the *majority* of the questions with which we concern ourselves. But in so exaggerating the presupposition, both in regard to its universality, its precision, and the amount of belief there need be in it, Schröder merely falls into an error common to almost all philosophers about all sorts of "presuppositions." Schröder (under ε, p. 5) undertakes to define a contradiction in terms without having first made an ultimate analysis of the propo-

sition. The result is a definition of the usual peripatetic type; that is, it affords no analysis of the conception whatever. It amounts to making the contradiction in terms an ultimate unanalysable relation between two propositions,—a sort of blind reaction between them. He goes on (under *2*, p. 9) to define, after Sigwart, logical consequentiality, as *a compulsion of thought*. Of course, he at once endeavors to avoid the dangerous consequences of this theory, by various qualifications. But all that is to no purpose. Exact logic will say that *C*'s following logically from *A* is a state of *things* which no impotence of thought can alone bring about, unless there is also an impotence of existence for *A* to be a fact without *C* being a fact. Indeed, as long as this latter impotence exists and can be ascertained, it makes little or no odds whether the former impotence exists or not. And the last anchor-hold of logic he makes (under *ι*) to lie in the correctness of a feeling! If the reader asks *why* so subjective a view of logic is adopted, the answer seems to be (under *β*, p. 2), that in this way Sigwart escapes the necessity of founding logic upon the theory of cognition. By the theory of cognition is usually meant an explanation of the possibility of knowledge drawn from principles of psychology. Now, the only sound psychology being a special science, which ought itself to be based upon a well-grounded logic, it is indeed a vicious circle to make logic rest upon a theory of cognition so understood. But there is a much more general doctrine to which the name theory of cognition might be applied. Namely, it is that speculative grammar, or analysis of the nature of assertion, which rests upon observations, indeed, but upon observations of the rudest kind, open to the eye of every attentive person who is familiar with the use of language, and which, we may be sure, no rational being, able to converse at all with his fellows, and so to express a doubt of anything, will ever have any doubt. Now, proof does not consist in giving superfluous and superpossible certainty to that which nobody ever did or ever will doubt, but in removing doubts which do, or at least might at some time, arise. A man first comes to the study of logic with an immense multitude of opinions upon a vast variety of topics; and they are held with a degree of confidence, upon which, after he has

studied logic, he comes to look back with no little amusement. There remains, however, a small minority of opinions that logic never shakes; and among these are certain observations about assertions. The student would never have had a desire to learn logic if he had not paid some little attention to assertion, so as at least to attach a definite signification to assertion. So that, if he has not thought more accurately about assertions, he must at least be conscious, in some out-of-focus fashion, of certain properties of assertion. When he comes to the study, if he has a good teacher, these already dimly recognised facts will be placed before him in accurate formulation, and will be accepted as soon as he can clearly apprehend their statements.

Let us see what some of these are. When an assertion is made, there really is some speaker, writer, or other sign-maker who delivers it; and he supposes there is, or will be, some hearer, reader, or other interpreter who will receive it. It may be a stranger upon a different planet, an æon later; or it may be that very same man as he will be a second after. In any case, the deliverer makes signals to the receiver. Some of these signs (or at least one of them) are supposed to excite in the mind of the receiver familiar images, pictures, or, we might almost say, *dreams*,—that is, reminiscences of sights, sounds, feelings, tastes, smells, or other sensations, now quite detached from the original circumstances of their first occurrence, so that they are free to be attached to new occasions. The deliverer is able to call up these images at will (with more or less effort) in his own mind; and he supposes the receiver can do the same. For instance, tramps have the habit of carrying bits of chalk and making marks on the fences to indicate the habits of the people that live there for the benefit of other tramps who may come on later. If in this way a tramp leaves an assertion that the people are stingy, he supposes the reader of the signal will have met stingy people before, and will be able to call up an image of such a person attachable to a person whose acquaintance he has not yet made. Not only is the outward significant word or mark a sign, but the image which it is expected to excite in the mind of the receiver will likewise be a sign,—a sign by resemblance, or, as we

say, an *icon*,—of the similar image in the mind of the deliverer, and through that also a sign of the real quality of the thing. This icon is called the *predicate* of the assertion. But instead of a single *icon*, or sign by resemblance of a familiar image or "dream," evocable at will, there may be a complexus of such icons, forming a composite image of which the whole is not familiar. But though the whole is not familiar, yet not only are the parts familiar images, but there will also be a familiar image of its mode of composition. In fact, two types of complication will be sufficient. For example, one may be conjunctive and the other disjunctive combination. Conjunctive combination is when two images are both to be used at once; and disjunctive when one or other is to be used. (This is not the most scientific selection of types; but it will answer the present purpose.) The sort of idea which an icon embodies, if it be such that it can convey any positive information, being applicable to some things but not to others, is called a *first intention*. The idea embodied by an icon which cannot of itself convey any information, being applicable to everything or to nothing, but which may, nevertheless, be useful in modifying other icons, is called a *second intention*.

The assertion which the deliverer seeks to convey to the mind of the receiver relates to some object or objects which have forced themselves upon his attention; and he will miss his mark altogether unless he can succeed in forcing those very same objects upon the attention of the receiver. No icon can accomplish this, because an icon does not relate to any particular thing; nor does its idea strenuously force itself upon the mind, but often requires an effort to call it up. Some such sign as the word *this*, or *that*, or *hullo*, or *hi*, which awakens and directs attention must be employed. A sign which denotes a thing by forcing it upon the attention is called an *index*. An index does not describe the qualities of its object. An object, in so far as it is denoted by an index, having *thisness*, and distinguishing itself from other things by its continuous identity and forcefulness, but not by any distinguishing characters, may be called a *hecceity*. A hecceity in its relation to the assertion is a *subject*

thereof. An assertion may have a multitude of subjects; but to that we shall return presently.

Neither the predicate, nor the subjects, nor both together, can make an *assertion*. The assertion represents a compulsion which experience, meaning the course of life, brings upon the deliverer to attach the predicate to the subjects as a sign of them taken in a particular way. This compulsion strikes him at a certain instant; and he remains under it forever after. It is, therefore, different from the temporary force which the hecceities exert upon his attention. This new compulsion may pass out of mind for the time being; but it continues just the same, and will act whenever the occasion arises, that is, whenever those particular hecceities and that first intention are called to mind together. It is, therefore, a permanent conditional force, or *law*. The deliverer thus requires a kind of sign which shall signify a law that to objects of indices an icon appertains as sign of them in a given way. Such a sign has been called a *symbol*. It is the *copula* of the assertion.

Returning to the subjects, it is to be remarked that the assertion may contain the suggestion, or request, that the receiver *do* something with them. For instance, it may be that he is first to take any one, no matter what, and apply it in a certain way to the icon, that he is then to take another, perhaps this time a suitably chosen one, and apply that to the icon, etc. For example, suppose the assertion is: "Some woman is adored by all catholics." The constituent icons are, in the probable understanding of this assertion, three, that of a woman, that of a person, A, adoring another, B, and that of a non-catholic. We combine the two last disjunctively, identifying the non-catholic with A; and then we combine this compound with the first icon conjunctively, identifying the woman with B. The result is the icon expressed by, "B is a woman, and moreover, either A adores B or else A is a non-catholic." The subjects are all the things in the real world past and present. From these the receiver of the assertion is suitably to choose one to occupy the place of B; and then it matters not what one he takes for A. A suitably chosen object is a woman, and any object, no matter what, adores her, unless that object be a non-catholic.

This is forced upon the deliverer by experience; and it is by no idiosyncrasy of his; so that it will be forced equally upon the receiver.

Such is the meaning of one typical assertion. An assertion of *logical necessity* is simply one in which the subjects are the objects of any collection, no matter what. The consequence is, that the icon, which can be called up at will, need only to be called up, and the receiver need only ascertain by experiment whether he can distribute any set of indices in the assigned way so as to make the assertion false, in order to put the truth of the assertion to the test. For example, suppose the assertion of logical necessity is the assertion that from the proposition, "Some woman is adored by all catholics," it logically follows that "Every catholic adores some woman." That is as much as to say that, for every imaginable set of subjects, either it is false that some woman is adored by all catholics or it is true that every catholic adores some woman. We try the experiment. In order to avoid making it false that some woman is adored by all catholics, we must choose our set of indices so that there shall be one of them, B, such that, taking any one, A, no matter what, B is a woman, and moreover either A adores B or else A is a non-catholic. But that being the case, no matter what index, A, we may take, either A is a non-catholic or else an index can be found, namely, B, such that B is a woman, and A adores B. We see, then, by this experiment, that it is impossible so to take the set of indices that the proposition of consecution shall be false. The experiment may, it is true, have involved some blunder; but it is so easy to repeat it indefinitely, that we readily acquire any desired degree of certitude for the result.

It will be observed that this explanation of logical certitude depends upon the fact of speculative grammar that the predicate of a proposition, being essentially of an ideal nature, can be called into the only kind of existence of which it is capable, at will.

A not unimportant dispute has raged for many years as to whether hypothetical propositions (by which, according to the traditional terminology, I mean any compound propositions, and not merely those *conditional* propositions to which, since Kant, the term

has often been restricted) and categorical propositions are one in essence. Roughly speaking, English logicians maintain the affirmative, Germans the negative. Professor Schröder is in the camp of the latter, I in that of the former.

I have maintained since 1867 that there is but one primary and fundamental logical relation, that of illation, expressed by *ergo*. A proposition, for me, is but an argumentation divested of the assertoriness of its premise and conclusion. This makes every proposition a conditional proposition at bottom. In like manner a "term," or class-name, is for me nothing but a proposition with its indices or subjects left blank, or indefinite. The common noun happens to have a very distinctive character in the Indo-European languages. In most other tongues it is not sharply discriminated from a verb or participle. "Man," if it can be said to mean anything by itself, means "what I am thinking of is a man." This doctrine, which is in harmony with the above theory of signs, gives a great unity to logic; but Professor Schröder holds it to be very erroneous.

Cicero and other ancient writers mention a great dispute between two logicians, Diodorus and Philo, in regard to the significance of conditional propositions. This dispute has continued to our own day. The Diodoran view seems to be the one which is natural to the minds of those, at least, who speak the European languages. How it may be with other languages has not been reported. The difficulty with this view is that nobody seems to have succeeded in making any clear statement of it that is not open to doubt as to its justice, and that is not pretty complicated. The Philonian view has been preferred by the greatest logicians. Its advantage is that it is perfectly intelligible and simple. Its disadvantage is that it produces results which seem offensive to common sense.

In order to explain these positions, it is best to mention that *possibility* may be understood in many senses; but they may all be embraced under the definition that that is possible which, in a certain state of information, is not known to be false. By varying the supposed state of information all the varieties of possibility are obtained. Thus, *essential* possibility is that which supposes nothing

to be known except logical rules. *Substantive* possibility, on the other hand, supposes a state of omniscience. Now the Philonian logicians have always insisted upon beginning the study of conditional propositions by considering what such a proposition means in a state of omniscience; and the Diodorans have, perhaps not very adroitly, commonly assented to this order of procedure. Duns Scotus terms such a conditional proposition a "*consequentia simplex de inesse.*" According to the Philonians, "If it is now lightening it will thunder," understood as a consequence *de inesse*, means "It is either not now lightening or it will soon thunder." According to Diodorus, and most of his followers (who seem here to fall into a logical trap), it means it is now lightening and it will soon thunder.

Although the Philonian views lead to such inconveniences as that it is true, as a consequence *de inesse*, that if the Devil were elected president of the United States, it would prove highly conducive to the spiritual welfare of the people (because he will not be elected), yet both Professor Schröder and I prefer to build the algebra of relatives upon this conception of the conditional proposition. The inconvenience, after all, ceases to seem important, when we reflect that, no matter what the conditional proposition be understood to mean, it can always be expressed by a complexus of Philonian conditionals and denials of conditionals. It may, however, be suspected that the Diodoran view has suffered from incompetent advocacy, and that if it were modified somewhat, it might prove the preferable one.

The consequence *de inesse*, "if A is true, then B is true," is expressed by letting i denote the actual state of things, A_i mean that in the actual state of things A is true, and B_i mean that in the actual state of things B is true, and then saying "If A_i is true then B_i is true," or, what is the same thing, "Either A_i is not true or B_i is true." But an *ordinary* Philonian conditional is expressed by saying, "In *any* possible state of things, i, either A_i is not true, or B_i is true."

Now let us express the categorical proposition, "Every man is wise." Here, we let m_i mean that the individual object i is a man,

and w_i mean that the individual object i is wise. Then, we assert that, "taking any individual of the universe, i, no matter what, either that object, i, is not a man or that object, i, is wise"; that is, whatever is a man is wise. That is, "whatever i can indicate, either m_i is not true or w_i is true. The conditional and categorical propositions are expressed in precisely the same form; and there is absolutely no difference, to my mind, between them. The *form* of relationship is the same.

I find it difficult to state Professor Schröder's objection to this, because I cannot find any clear-cut, unitary conception governing his opinion. More than once in his first volume promises are held out that § 28, the opening section of the second volume, shall make the matter plain. But when the second volume was published, all we found in that section was, as far as repeated examination has enabled me to see, as follows. First, hypothetical propositions, unlike categoricals, essentially involve the idea of time. When this is eliminated from the assertion, they relate only to two possibilities, what always is and what never is. Second, a categorical is always either true or false; but a hypothetical is either true, false, or meaningless. Thus, "this proposition is false" is meaningless; and another example is, "the weather will clear as soon as there is enough sky to cut a pair of trousers." Third, the supposition of negation is forced upon us in the study of hypotheticals, never in that of categoricals. Such are Schröder's arguments, to which I proceed to reply.

As to the idea of time, it *may* be introduced; but to say that the range of possibility in hypotheticals is always a unidimensional continuum is incorrect. "If you alone trump a trick in whist, you take it." The possibilities are that each of the four players plays any one of the four suits. There are 2^{16} different possibilities. Certainly, the universe in hypotheticals is far more frequently finite than in categoricals. Besides, it is an *ignoratio elenchi* to drag in time, when no logician of the English camp has ever alleged anything about propositions involving time. That is not the question.

Every proposition is either true or false, and something not a proposition, when considered as a proposition, is, from the Philo-

nian point of view, true. To be objectionable, a proposition must assert something; if it is merely neutral, it is not positively objectionable, that is, it is not false. "This proposition is false," far from being meaningless, is self-contradictory. That is, it means two irreconcilable things. That it involves contradiction (that is, leads to contradiction if supposed true), is easily proved. For if it be true, it is true; while if it be true, it is false. Every proposition besides what it explicitly asserts, tacitly implies its own truth. The proposition is not true unless *both*, what it explicitly asserts and what it tacitly implies, are true. This proposition, being self-contradictory, is false; and hence, what it explicitly asserts is true. But what it tacitly implies (its own truth) is false. The difficulty about the proposition concerning the piece of blue sky is not a logical one, at all. It is no more senseless than any proposition about a "red odor" which might be a term of a categorical.

The fact stated about negation is only true of the sorts of propositions which are commonly put into categorical and hypothetical shapes, and has nothing to do with the essence of the propositions. In a paper "On the Validity of the Laws of Logic" in the *Journal of Speculative Philosophy*, Vol, II., I have given a sophistical argument that black is white, which shows in the domain of categoricals the phenomena to which Professor Schröder refers as peculiar to hypotheticals.

The *consequentia de inesse* is, of course, the extreme case where the conditional proposition loses all its proper signification, owing to the absence of any range of possibilities. The conditional proper is, "In any possible case, i, either A_i is not true, or B_i is true." In the consequence *de inesse* the meaning sinks to, "In the true state of things, i, either A_i is not true or B_i is true."

My general algebra of logic (which is not that algebra of dual relations, likewise mine, which Professor Schröder prefers, although in his last volume he often uses this general algebra) consists in simply attaching indices to the letters of an expression in the Boolian algebra, making what I term a Boolian, and prefixing to this a series of "quantifiers," which are the letters Π and Σ, each with an index attached to it. Such a quantifier signifies that every individual of

the universe is to be substituted for the index the Π or Σ carries, and that the non-relative product or aggregate of the results is to be taken.

Properly to express an ordinary conditional proposition the quantifier Π is required. In 1880, three years before I developed that general algebra, I published a paper containing a chapter on the algebra of the copula (a subject I have since worked out completely in manuscript). I there noticed the necessity of such quantifiers properly to express conditional propositions; but the algebra of quantifiers not being at hand, I contented myself with considering consequences *de inesse*. Some apparently paradoxical results were obtained. Now Professor Schröder seems to accept these results as holding good in the general theory of hypotheticals; and then, since such results are in strong contrast with the doctrine of categoricals, he infers, in § 45 of his Vol. II., a great difference between hypotheticals and categoricals. But the truth simply is that such hypotheticals want the characteristic feature of conditionals, that of a range of possibilities.

In connexion with this point, I must call attention to a mere algebraical difference between Schröder and me. I retain Boole's idea that there are but two *values* in the system of logical quantity. This harmonises with my use of the general algebra. Any two numbers may be selected to represent those values. I prefer 0 and a positive logarithmic ∞. To express that something is A and something is not A, I write:

$$\infty = \Sigma_i A_i \qquad \infty = \Sigma_j \bar{A}_j$$

or, what is the same thing:

$$\Sigma_i A_i > 0 \qquad \Sigma_j \bar{A}_j > 0.$$

I have no objection to writing, *as a mere abbreviation*, which may, however, lead to difficulties, if not *interpreted*:

$$A > 0 \qquad \bar{A} > 0.$$

But Professor Schröder understands these formulæ literally, and accordingly *rejects* Boole's conception of two values. He does not seem to understand my mode of apprehending the matter; and

hence considers it a great limitation of my system that I restrict myself to two values. In fact, it is a mere difference of algebraical form of conception. I very much prefer the Boolian idea as more simple, and more in harmony with the general algebra of logic.

Somewhat intimately connected with the question of the relation between categoricals and hypotheticals is that of the quantification of the predicate. This is the doctrine that identity, or equality, is the fundamental relation involved in the copula. Holding as I do that the fundamental relation of logic is the illative relation, and that only in special cases does the premise follow from the conclusion, I have in a consistent and thoroughgoing manner opposed the doctrine of the quantification of the predicate. Schröder seems to admit some of my arguments; but still he has a very strong *penchant* for the equation.

Were I not opposed to the quantification of the predicate, I should agree with Venn that it was a mistake to replace Boole's operation of addition by the operation of aggregation, as most Boolians now do. I should consider the "principle of duality" rather an argument *against* than *for* our modern practice. The algebra of dual relatives would be almost identical with the theory of matrices were addition retained; and this would be a great advantage.

It is Schröder's predilection for equations which motives his preference for the algebra of dual relatives, namely, the fact that in that algebra, even a simple undetermined inequality can be expressed as an equation. I think, too, that that algebra has merits; it certainly has uses to which Schröder seldom puts it. Yet, after all, it has too much formalism to greatly delight me,—too many bushels of chaff *per* grain of wheat. I think Professor Schröder likes algebraic formalism better, or dislikes it less, than I.

He looks at the problems of logic through the spectacles of equations, and he formulates them, from that point of view, as he thinks, with great generality; but, as I think, in a narrow spirit. The great thing, with him, is to solve a proposition, and get a *value* of x, that is, an equation of which x forms one member without occurring in the other. How far such equation is *iconic*, that is, has a meaning, or exhibits the constitution of x, he hardly seems to

care. He prefers general values to particular roots. Why? I should think the particular root alone of service, for most purposes, unless the general expressions were such that particular roots could be deduced from it,—particular instances, I mean, *showing* the constitution of x. In most instances, a profitable solution of a mathematical problem must consist, in my opinion, of an exhaustive examination of special cases; and quite exceptional are those fortunate problems which mathematicians naturally prefer to study, where the enumeration of special cases, together with the pertinent truths about them, flow so naturally from the general statement as not to require separate examination.

I am very far from denying the interest and value of the problems to which Professor Schröder has applied himself; though there are others to which I turn by preference. Certainly, he has treated his problems with admirable power and clearness. I cannot in this place enter into the elementary explanations which would be necessary to illustrate this for more than a score of readers.

In respect to individuals, both non-relative and pairs, he has added some fundamental propositions to those which had been published. But he is very much mistaken in supposing that I have expressed contrary views. He simply mistakes my meaning.

In regard to algebraical signs, I cannot accept any of Professor Schröder's proposals except this one. While it would be a serious hindrance to the promulgation of the new doctrine to insist on new types being cut, and while I, therefore, think my own course in using the dagger as the sign of relative addition must be continued, yet I have always given that sign in its cursive form a scorpion-tail curve to the left; and it would be finical to insist on one form of curve rather than another. In almost all other cases, in my judgment, Professor Schröder's signs can never be generally received, because they are at war with a principle, the general character of which is such that Professor Schröder would be the last of all men to wish to violate it, a principle which the biologists have been led to adopt in regard to their systematic nomenclature. It is that priority must be respected, or all will fall into chaos. I will not enter further into this matter in this article.

Of what use does this new logical doctrine promise to be? The first service it may be expected to render is that of correcting a considerable number of hasty assumptions about logic which have been allowed to affect philosophy. In the next place, if Kant has shown that metaphysical conceptions spring from formal logic, this great generalisation upon formal logic must lead to a new apprehension of the metaphysical conceptions which shall render them more adequate to the needs of science. In short, "exact" logic will prove a stepping-stone to "exact" metaphysics. In the next place, it must immensely widen our logical notions. For example, a class consisting of a lot of things jumbled higgledy-piggledy must now be seen to be but a degenerate form of the more general idea of a *system*. Generalisation, which has hitherto meant passing to a larger class, must mean taking in the conception of the whole system of which we see but a fragment, etc., etc. In the next place, it is already evident to those who know what has already been made out, that that speculative rhetoric, or objective logic, mentioned at the beginning of this article, is destined to grow into a colossal doctrine which may be expected to lead to most important philosophical conclusions. Finally, the calculus of the new logic, which is applicable to everything, will certainly be applied to settle certain logical questions of extreme difficulty relating to the foundations of mathematics. Whether or not it can lead to any method of discovering methods in mathematics it is difficult to say. Such a thing is conceivable.

It is now more than thirty years since my first published contribution to "exact" logic. Among other serious studies, this has received a part of my attention ever since. I have contemplated it in all sorts of perspectives and have often reviewed my reasons for believing in its importance. My confidence that the key of philosophy is here, is stronger than ever after reading Schröder's last volume. One thing which helps to make me feel that we are developing a living science, and not a dead doctrine, is the healthy mental independence it fosters, as evidenced, for example, in the divergence between Professor Schröder's opinions and mine. There is no bovine nor ovine gregariousness here. But Professor Schröder and

I have a common method which we shall ultimately succeed in applying to our differences, and we shall settle them to our common satisfaction; and when that method is pouring in upon us new and incontrovertible positively valuable results, it will be as nothing to either of us to confess that where he had not yet been able to apply that method he has fallen into error.

C. S. PEIRCE.

NEW YORK CITY.

FROM BERKELEY TO HEGEL.

A CHAPTER OF THE HISTORY OF PHILOSOPHY EMBODYING A CRITIQUE OF THE PANLOGIST PHASE OF IDEALISM.

τὸ δ' αὐτό ἐστιν ἡ κατ' ἐνέργειαν ἐπιστήμη τῷ πράγματι.—Aristotle.

ACCORDING to Schopenhauer, Berkeley is to be viewed as the "father of Idealism which is the foundation of all true philosophy," a tribute which probably voices the opinion of a very large number of persons. In sober truth, however, this tribute is misleading. Plato, Aristotle (whose idealistic leanings Berkeley himself noted with approval[1]), and Plotinus among the ancients; Descartes, Malebranche, etc., etc., among modern philosophers all had a share in the making of Idealism, and their claims to notice cannot be summarily dismissed in the fashion favored by Schopenhauer. Indeed, *modern* Idealism is a river with numerous sources. And Idealism *as a whole* is not only of great antiquity, but the forms which it has assumed are most varied. It cannot be traced back to any one originator. None the less, however, is the value of Berkeley's work to be emphasised. We may well honor him as the first of modern thinkers who gave the ground-principle of Idealism its full due, asserting as he did *without show of reservation* that empirical Reality, as well "physical" as "mental," is simply a presentment for consciousness. It is in championing this truth and exposing at the same time the fallacies of vulgar realism that his

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[1] *Siris*, §§ 304-329.

permanent contribution to philosophy consists. Some luminous psychological work apart, his other achievements are of scant value and show poorly alongside the more thorough thinking of the Germans. His positive metaphysic inspired, it would appear, by his study of the Greeks and designed to proffer a merely improved rendering of the particular form of Theism current in his time, possesses no more than a historic interest. To-day even Idealistic Theists look for light not to Berkeley, but rather to the leaders of the Hegelian "Right." However, the obsoleteness of the form of Theism, which he upheld, should in no way diminish our admiration of the beauty and force of his criticism of vulgar realism. If I may be allowed to cite what I have urged elsewhere, "He showed in sun-clear language that perception and its objects are inseparable; that the world is as truly suspended in consciousness as is the most subtle of thoughts or emotions. It is this emphatic preaching of Idealism which ennobles him. Others before him had been Idealists, but none gave so luminous a defence of their faith."[1] Idealism is, of course, a term of wide import embracing strangely opposed schools of thought, but it may be confidently averred that "subjective," "sceptical," "critical," "psychological," "panlogist," etc., etc., idealists will all alike, when pressed, concede their indebtedness to the stimulus given by Berkeley. Sometimes, it is true, we note a tendency to patronise the Bishop,—and Kant himself is not altogether innocent in this regard,—but the attempts deceive nobody. Well has it been said that but for Berkeley there would have been no Hume and but for Hume no Kant. Aye, and but for Kant,—Fichte, Schelling, Hegel, Schopenhauer, and many of the leading idealists of to-day might never have caught the sparks that kindled their genius.

Δὶς καὶ τρὶς τὸ καλόν. In studying Berkeley one is apt to think him a "padder," a thinker who beats out a few grains of gold so as to cover acres. The answer is, of course, that he spoke as a pioneer; as an innovator who had to win adhesion to first principles before venturing to construct an elaborate system. Owing to the

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[1] *Riddle of the Universe*, p. 51.

stupidity of his critics he had to waste time over the A B C of Idealism and to keep on restating one or two main points almost *ad nauseam.* That he felt desirous of completing a regular system we may fairly argue from the *Siris*, which certainly is an ambitious advance on the earlier works. But not even that advance, notable as in many ways it is, redeems his philosophy from sketchiness. "*Without* is *within*, says Berkeley. Let it be so, says Hegel, and philosophy has still to begin. The same things that were called *without* or *noumenal* are now called *within* or phenomenal, but, call them as you may, it is their *systematic explanation* that is wanted. Such systematic explanation, embracing man and the entire round of his experiences . . . is alone philosophy, and to that no repetition of without is within, or matter is phenomenal, will ever prove adequate."[1] Berkeley of course really says more than this, but it will scarcely be disputed that it is his "*without* is *within*" rather than his metaphysical constructions, few and faulty as they are, that gives him his influence in philosophy. His standpoint, owing to the sketchiness above noted is one of a class the antithesis of that including Hegel—it admits of presentation in a short space. He is a Nominalist, and disciple of Locke who starts from the "given"—from experience—yet with a wish as Churchman to get somehow satisfactorily beyond this "given." No word-jugglery, however, for him; the discipline of Empiricism has pruned that bias, he must think in the presence of the object, not of mere phantoms of verbal thought. The start, then, is from experience, viewed at first from a quite Humean standpoint,[2] but latterly from that of an individualistic idealism. "The world is my presentment," matter a general name connoting phases of objects which are themselves only "ideas" or modes of consciousness—this contention is driven home persistently. The doubt that the seemingly individual "Ego" may possibly have to be resolved into a Universal Ego does

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[1] Hutchison Stirling Notes to Schwegler's *History of Philosophy*, p. 419, 8th edition.

[2] The Mind (Ego) is described in the *Commonplace Book* as a "congeries of perceptions"—only in a later stage as that which has the perceptions. It is, of course, this phase of Berkeley that Hume subsequently developed.

not trouble him. So far, then, so good. Seeing, however, that objects are ideas, modes of consciousness, why are they presented in the fashion in which we experience them? They appear, is the reply, not as mere modes of self-unfolding Egos, but as results of the working on these egos of a Divine Mind—of an intellect, an *actus purus*, in which the archetypes of all ideas of sense hang *realiter*. There is a multiplicity of subordinate individual Egos which know multiple worlds, all resolvable into shadowy ectypal phases of these luminous Archetypal Ideas. Berkeley tells us in the *Siris* that "sense implies an *impression* from some other being and denotes a *dependence* in the soul which hath it. Sense is a passion; and passions imply imperfection. God knoweth all things as pure mind or intellect; but nothing by sense nor through a Sensory" (*Siris*, § 289). Proceeding on these lines, he approximates to a system of Platonic Ideas upheld in a Supreme Idea, and transformed by it in part and obscurely to us individuals. Still there is a very notable contrast to be indicated. Berkeley's IDEAS are in no way the empty abstractions re-ified by Plato; indeed, the worship of "Universals" (those makeshifts of our weak intellects striving to extend their empire by way of *symbols* and *words*) would have been inconsistent with his sturdy Nominalism. Such preposterous figments as "Likeness," "Greatness," "Smallness," and like hypostatised attributes have no interest for him. Not shadowy Universals, but *concrete*, stable, unitary archetypes of the concrete but transient objects present in our *numerically different* worlds constitute his quarry. Thus the many Vesuvii present in the consciousness of human percipients are for him *ectypes* only of the complete *archetype* Vesuvius which obtains in the Divine Mind, and in which we share only in a most confused and imperfect manner. The solution is certainly compatible with Nominalism. The Berkeleyan Archetype is not a vague Platonic *abstraction*, such as "volcanicity" or "magnitude," but a *particular*, though an exceedingly complex, object in the consciousness of God. And unlike Plato's idle Universals, it is conceived as energising freely on us, thereby calling into reality the phenomenal or ectypal object we know.

The history of Idealism necessarily comprises that controversy

as to "Relations," latterly so emphasised, and, I must add, absurdly complicated and confused by German Epistemologists. Berkeley's attitude in this regard is instructive. At the outset of his thinking he was obviously too absorbed in his analysis of "Matter" and "visual space" to notice the as yet unexposed blemishes in Locke's Theory of Experience. He was content to view the development of perception out of space and time-ordered sensations much as did Locke, save that he laid more stress on what would be now called "Association" as interpreter of sense, and distinguished most ably between the space of our mature, and the space of our dawning, consciousness. Locke's obscurities touching "Ideas of Relation" in general seem to have at first quite escaped his notice. It is interesting, therefore, to detect in his later work, the *Siris*, gleams of what may almost be termed Kantian thinking, and the obvious weakening of his old sensationalist bias; a bias which in his case, as in many others, in no way impaired his loyalty to idealism. "Strictly the Sense knows nothing" (§ 253). "As Understanding perceiveth not, so Sense knoweth not" (§ 305). And how suggestively he alludes to the *tabula rasa* doctrine. "Some perhaps may think the truth to be this:—that there are properly no ideas or passive objects in the mind but what were derived from sense, but that there are also besides those *her own acts or operations*; *such as notions*" (§ 308). One is here within measurable distance of the Kantian Categories. I say measurable only because these notions are still present in the vaguest possible way and indeed grew wholly out of Berkeley's studies of Platonism (so markedly apparent in the *Siris*), not out of the so notably novel epistemological way of viewing things which yielded Kant's *Critique*. Still Berkeley evinces a distinct tendency to substitute *intelligi* for *percipi* as the support even of our ectypal imperfect worlds.

Idealism is the only possible form of a competent metaphysic, —this view, if left somewhat indeterminate, it is Berkeley's signal merit to have emphasised. But his Theological rendering of Idealism is faulty. The Berkeleyan Deity is advanced as a theologian's substitute for the "stupid, thoughtless somewhat" which Locke posited as the substance of objects and cause of our sensations.

And the positing of this Deity as *cause* of the said sensations involves an assumption, nowhere adequately vindicated by Berkeley, to wit., that of the transcendent validity of Causality, i. e. the belief that the notion of cause and effect can be used, not only within the confines of experience, but also to explain experience itself as *caused* by an agency or agencies beyond its pale. A consistent empiricism cannot accommodate this truly portentous assumption. That our sensations *must* have a cause beyond ourselves who have them is a view requiring close criticism. And that the cause is a Personal Deity, himself no *sensating* Ego but a purely *intellectual* being, who somehow affects us across a void, is a further development of hypothesis, open to still more exacting criticism.

In mooting his theory of Sensations Berkeley observes that their cause must be sought in spirit, "since of that we are conscious as active,—yet not in the spirit of which we are conscious, since there would be then no difference between real and imaginary ideas; therefore in a Divine Spirit." But it is not at all necessary to seek for the cause in the *conscious segments* of our Egos or "spirits," for nobody believes that we *consciously* originate our sensations. It may well be urged that the said Egos or "spirits," like Leibnitzian monads, evolve both their sensations and ideas out of themselves, *only attaining self-awareness or consciousness as result of their self-activity.* Berkeley himself admits that the Ego is not an "idea," but rather *that which has ideas.* Why, then, should not this veiled Ego produce sensations for itself and fusing with, and opposing to, these the requisite "imaginary" ideas, suspend a perfectly satisfactory microcosm within itself? Such a view would at least allow him to dispense with an uncritical *assumption* of the transcendent validity of Causality. He would not then depart from the closed circle of the individual Ego, for which the Experience, which has to be interpreted, obtains.

This Theological Idealism is, therefore, improperly established at the outset. Nor, while thus improperly established, does it constitute even a good working explanation of Reality. Exposition of a *coherent, slowly-unfolding world-whole,* in some way *common* to, and the *nursery of,* all percipients is denied us. The actual world, the

world known to science and "common sense," is for Berkeley only a series of transient perceptions in us and animals, an aggregate of phenomena that come and go in the consciousness of numerically different "spirits." Nature is a tangle of broken, one-sided, and very limited experiences in us and like dependent individuals; the history of the solar system, æons of which, as science and common sense hold, preceded the evolution of our consciousness, is demolished at a stroke. It may, indeed, be urged that Berkeley has posited an archetypal Nature in the Divine Mind; a Nature, the *esse* of which is not dependent on *percipi*, so far at any rate as men, animals, etc., are concerned; and that this Nature is competent to furnish a *full* explanation of the standing of the "ectypal" worlds we know. The difficulty, however, is to show how this *timeless* unitary and *complete* Nature is dovetailed with the *time-conditioned, numerically-different*, and miserably *fragmentary* Nature*s* which are suspended in the consciousness of human and lower egos. We have here a problem which was never solved, or, to the best of my knowledge, even confronted by Berkeley.

We may here indicate a further difficulty, one, however, by no means peculiar to the theological idealism of Berkeley. What is the *ultimate ground* of the egos or "spirits" on which the Deity is said to imprint sensations? Is this ground God himself? Berkeley and some influential moderns are of this opinion. But surely it is absurd to posit any individual, however exalted, as the ground of individuals who in respect of their bare individuality are necessarily *other than* himself? One centre of consciousness may affect other centres of consciousness, but how is it that the latter are *in situ* to be affected at all? If, on the other hand, God is not the ultimate ground of the Egos we seem driven to accept Pluralism, or to posit a deeper principle of which Deity and the Egos are alike mere aspects, a principle not in itself conscious as prius, but withal the source of consciousness. And this last consideration opens up a theme of momentous importance with bearings not only on a passing system such as Berkeleyanism, but on the interpretation of Idealism for all time. It has been voiced in varied phases by many

writers; for the present let us consider its purport in the regard of Berkeley.

That my or Smith's consciousness has had a history, that we as self-cognitive beings arose in time, is certain. Or to put the matter otherwise, at the present moment our Egos, in Berkeleyan phraseology, have "ideas," that is to say feel, think, and perceive. But feelings, thoughts, and perceptions are ever coming and going and if we trace their sequences back far enough we shall reach by inference a point when our Egos had *no conscious experience* at all. What, then, of these Egos posited as devoid of a consciously known content—as unprovided by Deity with sensations? Obviously we reach *consciousless centres*; hence, if we wish to retain multiple Berkeleyan Egos, we must retain them not as conscious spirits, but rather as Leibnitzian monads, potentially but not necessarily always actually conscious. But this is not all. One of the great objections that wars against the Theism of Leibnitz wars against that of Berkeley. On what grounds is a *conscious* "Mind" posited as prius of the Reality imparted to these multiple Egos? If Berkeley requires an "active power," not inherent in the Egos themselves, to account for sensations, why must that Power be assumed as conscious rather than METACONSCIOUS? If Experience is to be his guide, he ought not, of course, to overstep it by means of a notion (causality) borrowed uncritically from it. But even had his use of this Notion been vindicated, he ought to have borne in mind that Experience reveals every known conscious individual or "empirical ego" as *arising in time*, the actual as always a mere oasis in the potential, that our very perceptions of objects are replete with ideas of sensations which *may* be, but are not, realised, that the area of consciousness even in the case of a Titan of knowledge is always at any given moment most narrow. Experience in fact is all in favor of the Metaconscious as *prius* of the conscious, not, therefore, in favor of a Theistic Idealism. I am aware, however, that many neo-Hegelians view consciousness as the "form of eternity," and that Berkeley is on this count in very good modern company. By these thinkers, as by Berkeley, Reality, grasped in inadequate and inconsistent pieces by us, is viewed as all-together in a conscious God, a

self-thinking "Idea" for which potentiality is not. And the "Idea" thus championed is regarded as the *basis of advanced religion*, of that religion which has been defined as "philosophy speaking naïvely." It appears to me that this position is not only untenable on *philosophic* grounds, but of no service to *sentiment*, to advanced *religion*, "natural" or other. On the lines of idealistic Theism, the "Idea" must be the fountain-head of *all*, note it well, *all* cosmic activities. And surely we cannot soberly and honestly worship an "Idea" supposed to ideate cruelties, diseases, obscenities, and all the grim defects of this planet as phases of its complete reality! Is not the sneer of Schopenhauer relevant here? Is the "Idea" that "thinks" the drama of the snake and the squirrel, when something else might be thought, a fit object of reverence? Of a surety Dualism, not an idealistic-Theistic Monism, is the prop of the ordinary religionist.

Had Berkeley—I note one glimpse only in *Siris*, § 257—suspected that consciousness is only a flower on a stem fed by roots in the METACONSCIOUS, he might have achieved a notable advance on his earlier theory of Matter. After all it is only against vulgar Realism with its re-ified Abstraction "Matter" that his idealist polemic holds good. As against "unperceived objects" alleged to be resisting extensions inhering in a surd "substance," it is decisive enough. But as against such objects viewed as *potential modes of consciousness*, as metaconscious spiritual activities, it is irrelevant. For instance a Nature-philosophy such as that of Schelling may well posit objects that have never yet been, and indeed may never be, mirrored in the consciousness of percipients, and nevertheless maintain its idealism intact. Aristotle (who verges on Absolute Idealism) identifies, it is true, *actual* knowledge with what is known, but he does not for all that make my teapot's whole standing dependent on my passing perceptions. He backs the actual with the potential.[1] Berkeley's error here was to place all movement solely within

[1] If Aristotle's standpoint is to be attained, the distinction between potential existence (*ἐν δυνάμει*) and actual existence (*ἐν ἐντελεχείᾳ, ἐν ἐνεργείᾳ*) must always be borne in mind. *Actual* knowledge for him coincides with the *thing* known, but, nevertheless, the thing when unknown may possess a potential existence quite independent of our consciousness. It is to be noted, however, that Aristotle does not

consciousness—in the actual—ignoring the alternative that the well-springs of consciousness may be traced to the *Metaconscious*, (whether logically symbolised or otherwise). Hence his belief that his Idealism was to sound the death-knell of Atheism and Scepticism. He destroyed and rightly destroyed the philosophers' "Matter," and showed that an extra-experiential ground of objects, if we are to conceive *or even discuss one at all*, must be posited as *spiritual*. What he overlooked was the consideration that spiritual activities—the only admissible ground—may be not only conscious but meta or super-conscious. This oversight is sharply rebuked by the subsequent history of philosophy. Thus Schopenhauer is an admirer of Berkeley, is strictly *idealist*, but a votary to all intents and purposes of that very *Atheism* which the Bishop so strenuously sought to overthrow!

So much, then, for the positive metaphysic of Berkeley. Idealism changes its garb with Hume. He is Berkeley *minus* the Divine Mind and the subordinate Egos, professes to view Experience, inner and outer, as a stream of atomistic "perceptions" or states. Locke's old theory of "Relations" is worked out to the bitter end —the current empiricism exploited to the full—a general "loosening" of Reality effected. We may term him an Agnostic Idealist, and note with interest his influence on Kant, which, by the way, extended to other issues than the Causality-problem mentioned by the Königsberg philosopher. The Dryasdusts of university chairs are apt to dwell too exclusively on the more academic phases of Hume's thinking. His contributions to philosophy in general have proved of great value to later writers, including agnostics and metaphysicians alike, classes of thinkers who do not usually drink at the same fountain.

The next step in Idealism we find in Kant. What, in brief, is his standpoint? It is a novel subjective idealism (qualified by a sometimes hesitating acceptance of "things-in-themselves"), allied with a *Thought-Theory* of Experience, vaguely, very vaguely antici-

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carry this doctrine of potentiality as far as he might have done, for his Ultimate Creative Intellect or Deity is *actus purus*, completely actual or conscious.

pated by Berkeley (*vide supra*). On Kant's showing, Sensations unified in Space and Time are subsumed under *a priori* Notions or Categories and forthwith emerge as Experience, as that very Real World, back to which the psychologists had traced the sources of knowledge. Empirical realism is taught, for are not objects immediate facts, transcendental idealism, for these facts again are but modes of a knowing consciousness. Experience is constituted by necessary relations, but cannot be transcended. Touching soul, rational cosmic lore and Deity, we must, as speculative reasoners, be agnostic. Still, despite Kant's speculative agnosticism, the germs of a Hegel are here—Categories or Concepts, though not yet worked up into a system, appear as *prius* of Nature and the inner psychological order or "Mind." Kant is puzzled, it is true, when he deals with the *crux* of the rise of sensations, failing which he says, Categories are empty; but the resort to occult Things-in-themselves to account for them is obviously erroneous. On his own showing Causality must not be used transcendently—his Idealism is debarred from flying to surds of this kind. Has he not also proclaimed the need of deducing all reality from a single principle? Eager to demolish the belief in Things-in-themselves and to deduce Reality from the required single principle, uprises Fichte and spins Reality, sensations, space, time, and the categories alike out of Kant's pure Ego now exalted to the rank of an *Absolute Reason* or I as Universal, as the ground of all modes of empirical consciousness. The Absolute Ego posits a non-Ego within itself—reflects itself into itself—makes itself its own object that it may realise its freedom *in concreto*—hence a world and individuals driven by the moral law to abolish this world. Fichte's doctrine of perception is not subjective idealism proper; he places Reality only in the Absolute common Ego. The Things-in-themselves are repudiated, hence Epistemology and Ontology kiss one another. Nature is ideally real, reflects only obstructed activities of this Ego, possesses in fact no show of independent standing. To empirical individuals this Nature necessarily seems foreign, yet, after all, it is but a self-limitation of the Universal Reason revealed in and bottoming them. This solution, plausible in many ways, will not,

however, enable us to rethink science satisfactorily. Ideal-Realism requires an amendment, and Schelling comes forward as propounder of one. Mind and nature, ideal and real, are by him treated as having equal claims to recognition, as sides of an underlying Unity —we have the system of Absolute Identity. Schelling's Absolute, however, is no Spinozist indeterminate Substance, but rather Fichte's Absolute Ego or *Reason*, and of this mind and nature are revelations of coequal standing. One of Schelling's signal merits is his development of the doctrine of "unconscious intelligence" (first prominently espoused by Leibnitz among moderns), which enables him to assert a world-order prior to consciousness and to give Nature generally a free swing without prejudice to idealism. The thing-in-itself *as surd* is no more present here than with Fichte; but besides objects presented in actuality as lit up by consciousness there are to be admitted objects in potentiality as "unripe intelligence." This objective "Real-Idealism" admits that the object may be in itself far richer than the object as mirrored in consciousness, and further views consciousness itself with its ideal and real aspects as emergent in a time-process from Nature. It is in the human brain that Nature first returns fully on herself, "whence it is clear that Nature is primarily identical with that which is realised as consciousness and intelligence." On the side of the latter the "ideal," on that of Nature the "real," aspect of the Absolute Reason is dominant. On these positions hinges that part of Schelling's theory of Perception which has materially influenced his successors. Details and later developments must be omitted. Passing on to Hegel, we note the complete exploitation of the Category-theory of Experience broached by Kant and absorption and amendment of previous idealist standpoints generally, which invite close attention. No one now, I presume, regards either Fichte or Schelling in the light of infallible Masters, however illuminative they may prove, but on the contrary many of our most acute modern thinkers are practically disciples of Hegel. Indeed, Panlogism is viewed by many critics as destined to stand or fall with his system. It may, therefore, prove of interest to dwell at some length on his standpoint and subsequently to indicate in what directions success-

ful amendments of it have been made, or are likely to be made in the future. The first requisite, however, of any advance is full realisation of the stage one has to leave behind. Let me endeavor, therefore, to trace briefly according to my lights the leading causes which seem to have mediated the imposing structure of Hegel. This structure embodies, to my thinking, one of the greatest delusions of philosophy—that of the Concept viewed as *prius*—a theory which has led countless inquirers astray, and justifies in great measure the bitter polemic of a Schopenhauer. Nevertheless, the delusion colors much of ancient, and more still of mediæval and modern speculation. To assail it effectively, one must confront it in its most definite and pronounced form. Hence Hegel's importance for critics. He is nothing, if not a Panlogist, and in assailing him we assail Panlogism in its most ambitious form; in Hegel, in fact, we confront the protagonist of exploiters of the Concept,—of that standpoint which upholds Reason as *prius* of reality. We are all familiar with his amazing grasp of Method and unflinching championship of Reason as "sovereign of the world." And most of us would probably admit that, if Reason is really sovereign, his system must on all fundamental counts be right. Reason will probably never find a more interesting and methodic champion than Hegel, indeed most philosophic advocates of the sovereignty of Reason view his *Logic*, *Nature-philosophy*, and *Philosophy of Spirit* as in general outlines valid, though they may need, and notably the Nature-philosophy, extensive alterations in the matter of details. Hegel, therefore, is the special objective of those who, like myself, reject reason as *Prius*.

I do not propose here to summarise Hegelianism. The articulation of that system is such as scarcely to admit of a summary. Assuming my readers' conversance with the system, I shall first note very briefly the source of its germinal ideas and then indicate various leading points touching which the Metaphysic of the future must, in my opinion, oppose it.

"Kant's Categories form really the Substance of Hegel" observes Dr. Stirling. And obviously the system would be meaningless to all who have ignored Kant. Categories viewed as logical

articulation of the Idea as timeless *prius* in the "Logic"; categories viewed as externalised in the contingent particularity of Nature (that *ratio mersa et confusa*), categories viewed as realised in the at-one-ment of the Idea with itself as Mind or Spirit—surely these universal thought-forms or notions are indeed the "substance" of Hegel. But the "substance" thus accurately indicated has "modes" which a mere reference to Kant will not, of course, account for. Hegelianism as avowedly a synthesis, the "truth" of a series of varied world-historic standpoints, had to include much more than Kant. And it is here that an illuminative fact crops out. While nominally inclusive of all the standpoints, Hegelianism absorbs some with peculiar relish. Prominent among these are those of Plato and Aristotle. Plato's Universal or *Idea* is no doubt so formal as to be only attained at the cost of sacrificing and really leaving unexplained the concrete spheres of "world" and "mind" we know. But for all that it is a bold, if in many ways, halting attempt to exhibit the concept as *prius*, and on that account specially stimulating to an avid student of Kant such as was Hegel. *Here* in Plato was the inadequately realised but most suggestive endeavor to identify reality with Thought; *there* in Kant's category-doctrine (when amplified and dialectically developed) lay the secret of how the identification was to be effected. The stimulus once given, rationalisation of the entire range of Reality as we have it—*to the exclusion of all the old surds*—became the ambition of the German thinker. "It may be admitted," writes Dr. Stirling, "that there are in Plato partial efforts towards a single plastic element or energy, a single all of thought, whose distinctions were constitutive pairs of fluent notions." And we shall further recall that belief in a *relationship* of notions or concepts, which admits of logical passage from one to the other *without reference to crass fact*, is an undeniable position of Plato. Dialectic as treating of the relations of these notions is also his ontology. The standing of the flux of nature and mind as explained by Hegel was also in part probably suggested by Plato. Categories, the unitary universal notions "realising themselves in multiplicity," as projected into the sphere of crass contingent phenomena, recall the Platonic notions which appear as if

broken into a manifold in their shadowy copies in the sense-world. Much else offers itself for mention, but enough has been said to enable us to enter a preliminary caution. If the headquarters of Hegel lie in Plato, and if, as we know, Plato is *the* philosopher of *abstractionism*, suspicions must arise that the contaminated headwaters have carried their infection far down stream. And these suspicions are to my thinking validated by facts. Great as Plato has been as a stimulus to thought, he is avowedly an abstractionist of the most daring kind, and the *abuse of notions* traceable to him has, I believe, fouled the whole history of philosophy, but most notably that part claiming Hegel and the Hegelians. Let us consider for a moment the genesis of the notion-controversy and realise out of what really trivial antecedents this exaggerated respect for the "labor of the notion" arose. Let us go back to Socrates. In quest of the clarification of men's thoughts with a manly ethical end,—clear knowledge implying for him virtue,—what did he effect? He did nothing (his personal influence apart) but teach men by way of rigid definition and the "irony" that their *verbal thinking* was confused and that the attainment and use of names with clearly thought applications and implications was imperative. The clarified concepts which he ushered into use came however insensibly and by a natural illusion to seem more real than the particulars to which they referred—*they* were the wheat of reality, the rest was chaff. Hence Plato (with an eye also to reconciling current systems or rather patches of thought) *hypostatised*, and extended them, and finally set up a Dialectic or Ontology touching their "intelligible" relations. Hence again arose the modifications introduced by Aristotle, endless mediæval disputations and the later notion-philosophies, the upshot of which has been the darkening of the problems treated in a manner that has tended to make all metaphysic seem ridiculous, a "splendid folly" as a famous agnostic would put it. There can be little doubt that on the fatal hypostasis of the concept and the preposterous importance attached to concepts generally—an importance which their abstractness should never allow us to overrate—rests the responsibility for most of the existing disgust with metaphysic. In view of the known inadequacy

of *content* of concepts considered in relation to their concrete objects, we ought to require very strong evidence before invoking concepts *of any kind* in plumbing the source of Reality. The danger of mistaking the shadow for the substance is obvious. Concepts of the empirical kind are only of value in so far as they facilitate our grasp of presented or re-presented Reality; they are a delusion and a snare if made ends in themselves and give rise to the word-juggler and schoolman. The "Universals" of the metaphysician must, therefore, be viewed with suspicion at the outset.

The hints gleaned by Hegel from Aristotle were numerous. The timeless Creative Intellect, the "eternally complete" active Reason which is ground, support, and presupposition of thoughts and things, the doctrines of form and matter and drift towards Absolute Idealism, the immanence of Universals in things explanatory of the world-stir (from which Plato's inert Ideas, like epicurean gods, had been clumsily held aloof), the soul as realising essence and "truth" of body, the allocation of a domain to "chance," (as opposed to rational productivity) in the world-order; the view that the higher manifestation may include the lower, and that the last in time may be the metaphysical first, and many other points deserve mention. The Aristotelian doctrine that Universals indwell and energise in things, amending the Platonic view, curiously recalls the post-Kantian treatment of the categories amending the view of Kant—categories being made immanent in, instead of being superimposed on, phenomena. This, however, by the way.

To be aware of the inspiring ideas of any given system, is to have in large part explained it. Any thinker with a long life and ordinary industry is capable of developing his standpoint in the detail, but he does not ordinarily add much to the stock of germinal ideas with which he sets out. Hence the fundamental importance of tracing the pedigree of these ideas. In the case of Hegelianism, the germinal ideas bearing on Panlogism seem to proceed almost wholly out of Plato, Aristotle, Kant, Fichte, and Schelling. And of these masters the two former, at any rate, are both tainted with *formalism*. Not unreasonably, then, should we anticipate that "misleading stress on the abstract universal," with which even Dr.

Stirling charges the Hegelian Logic. The most influential teachers of Greece, more reliable guides in the view of Hegel's contemporaries than they are for us, must have inoculated him effectually with the bias.

Originality, it has been well said, consists in first absorbing other people's thoughts.[1] Hegel's indebtedness to Kant's "Analytic" and "Dialectic," to Fichte's Transcendental deduction and transformation of the categories into conditions of experience posited by Absolute Thinking, to Schelling's objective idealism, potence-scheme, and view of the world-history as revelation of the Absolute, etc., etc., and to Jacob Bohme, is notorious. If he developed much, he received much. His rehabilitation of *Reason* as against the later mysticism of Schelling, his improvements and striking use of the Dialectical Method, and his attempt to rethink, (and to exhibit the sovereignty of Reason in) all the main departments of Human Experience constitute his striking work. I shall now briefly consider some of the leading objections which bear upon his positions, more especially as interpreted by the conservatives of the Right wing of his school. Space will not allow me to exhaust these objections, but I trust that the defects of treatment which may be observable, will be accompanied by suggestions of compensatory value.

THE PROBLEM OF THEISM.

As interpreted by the Hegelian Right, the Idea is a *conscious* Prius, an intelligible unitary actuality as opposed to a mere potentiality or "initselfness" of subjectivity. We arrive thus at Green's "eternally complete" consciousness; only time-severed patches of the rational whole constituting its content being revealed to us empirical individuals, each of whom, however, reproduces aspects of the rational whole in his mind and comes in time to recognise *explicitly* as rational what was ever *implicitly* this. In the course of this reproduction it "uses the sentient life of the soul as its organ" (Green, *Proleg. to Ethics*). A thinker of this school would,

[1] Professor Nicholson.

no doubt, agree heartily with Schopenhauer's remark, "An impersonal God is no God at all but a misapplied word." And it must, I think, be conceded that a Hegelian who professes a religious conservatism, but declines withal to admit that the Idea as *prius* is conscious, is in an awkward quandary. If one thing is more certain than another, it is the fact that conservative religionists in Europe, rightly or wrongly, require the retention of a *conscious personal* God as the author and sustainer of Reality. An impersonal fontal Reason may do duty as the basis of an Idealistic *Atheism*, but proffered as the philosophical rendering of the Christian's God it is absurd.

There are, however, so-called Hegelian Theists who, while accepting an Impersonal IDEA or REASON as *prius*, profess to find God in the "Absolute Idea," that is to say in the Idea or Reason as realised or *made explicit* in philosophy, art, science, and history as a whole, an unfoldment which is realised in its turn through "finite spirits," such as we. I fail, however, to see in what manner a God of this kind can be regarded as constituting the ideal of the religionist, the man who attends churches, and believes in the efficacy of prayer, and the variety of dogmas embraced under the name of Christianity. But let this pass. I have now merely to point out that such a God cannot be regarded as either infinite or necessarily eternal. Not infinitude but (if I may use the term) indefinitude "foams from the goblet" of a "spirit-empire" realised through individuals. As the "finite spirits" come and go, advance and decline, so, too, must this God wax and wane. He is subject to so low a category as Quantity. However numerous and advanced the "finite spirits" may be, they could always be conceived as more numerous and more advanced, and the "spirit-empire" consequently as susceptible of fuller development. God would, therefore, never *exhaust*, never fully realise in Himself the infinite potentialities of manifestation latent in the Impersonal Reason, would, therefore, be only indefinite, not infinite. And His eternity would be assured only on the supposition that the eternity of the world-process also is assured. A *Maha-pralaya*, such as that of which Hindu mystics dream, would extinguish Him. For clearly a God

who is real only through mediation of "finite spirits" must lose consciousness when the latter lose consciousness.

The theory of a *conscious* fontal Reason is attended with difficulties of another kind. At the outset we must observe that there is no scope for dogmatic assertion in this controversy. Hegelians profess only to explain experience and a Theistic Idealism is merely one among various hypotheses which may serve to explain it. We only know directly our own states of consciousness. The problem is,—Does the reality of this consciousness force us to infer a creative god-consciousness as its ground, or is there a more effective hypothesis forthcoming?

Now I must urge here, as I have already urged elsewhere, that no one individual however exalted serves to explain the origin of other individuals. A conscious God is in virtue of His very self-awareness or consciousness *cut off* from the spheres embraced by the consciousness of other individuals. Even were He conscious of all that of which these other individuals are conscious, He would still remain only the leading monad in a hierarchy of monads. All selves in respect of their bare self-hood are discrete impervious ultimates: We can speak in Hegelian language of a *known* object as "an other which is not another," but not so of an alien *knower*. All Selves are selves "in their own right," though they may greatly further or hinder one another's activities. We must posit, in fact, a principle other than a God-consciousness as ground of ourselves, that is if it is necessary to posit a ground at all.

The Ultimate ground of Reality, it would seem, has to be found in what I have elsewhere termed the Metaconscious, a spiritual activity *ὑπέρσοφος ὑπέρζωος* best discussed as the basis of a monadology. All available clues seem to indicate that consciousness (i. e., spiritual activity under the form of self-awareness) is a *posterius*, never a prius, that, in fact, the actual is only a star-point visible against the dark background of the potential. Consciousness has a very limited range; its content streams ever out of potentiality into actuality; only the veriest fragment of our experiences, perceptual and mental, is present to us at any given moment, while perception itself is possible only in virtue of associated ideas

of *unrealised* sensations. In fact, reflexion on the features of our individual experience —the *datum* on which metaphysic necessarily founds—makes for the theory of the Metaconscious. Consciousness, the actual, is the flower, not the root.

One would like, on the Theistic assumption, to have one more riddle answered. If God is held to be source of my consciousness, how can it be urged that He was complete before my rise? It would be absurd to hold that my *consciousness* was suspended in his "eternally complete" consciousness without my being aware of the fact. Here at least, then, potentiality would seem to eclipse actuality, here a conscious God is eternal along with a somewhat that was once not conscious at all. I at least became conscious in time. Did I then spring from a metaconscious ground of which God knew naught?

It is hard that Conservatism should reap no harvest. But the uselessness even to Theology of this Hegelian Theism is well pointed out by Mr. Balfour, "Neither the combining Principle alone, nor the combining principle considered in its union with the multiplicity which it combines, can satisfy the requirements of an effectual Theology. Not the first, because it is a barren abstraction, not the second, because in its all-inclusive universality it holds in suspension, without preference and without repulsion, every element alike of the knowable world. Of these none, whatever be its nature, be it good or bad, base or noble, can be considered as alien to the Absolute; all are necessary and all are characteristic." The worthlessness of this Theism to the average worshipper will be, perhaps, still more vividly realised when it is remembered that Hegel viewed religion as God's self-consciousness,[1] and that such atrocious cults as the religions of the Syrians and Phœnicians, the so-called "religions of pain," figure as moments of the dialectic of religions (culminating in the absolute religion or Christianity). Can we wonder that some writers have used angry words in discussing Hegelianism? Can we be seriously asked to worship a Being who unfolds

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[1] Religion = "the knowledge which the Divine Spirit has of himself through the mediation of the finite spirit." (Hegel.)

His "eternal essence" in a time-process which yields the abominations of Moloch and Adonis, to ignore more primitive and in some cases even more cruel cults? Can the clerics of the "Absolute Religion" honestly inculcate a "philosophical Theism" which embraces this monstrous view? We may, however, press the point further and contend that *all idealistic Theisms alike are unsatisfactory.* On the shoulders of a Deity, *who is sole prius*, rests the responsibility for every event which our moral judgment deplores. Every iniquity of man, for instance, must in consistency be traced back to this Deity, for what for such a Theism are individuals but His manifestations? We cannot see in a Nero anything but a phase of his activity. "Un être qui a tout reçu, ne peut agir que par ce que lui a èté donné, et toute la puissance divine qui est infinie, ne saurait le rendre indépendant," runs a passage culled by Schopenhauer from Vauvenarques and the passage is singularly relevant. The advance of ethical ideals must render such a Theism unwelcome, if not objectionable. The philosophy which professes to "rethink" Christianity on conservative lines such as these will one day be viewed as an imposture.

THE PROBLEM OF THE RATIONALITY OF THE PRIUS.

Whether the prius is or is not conscious is after all a matter of debate even among Hegelians. All, however, of these latter who have any real claim to their title contend for its *rationality*, and no student of Hegel can doubt *his* view for a moment. Now this exaltation of Reason stands for the culmination of the formalist Platonic movement already noticed. A unity of intelligible categories is discussed as timeless *prius*, the logical articulation of its moments being painfully demonstrated. In this dialectical process we confront, so it is said, the "pure reason"—God in his eternal essence as ground of reality. And in these categories we have to note the Idea-determinations which underlie nature and the individual mind, viewing them in a dry light abstracted from the multiplicity and confusion in which they appear in actual experience. A masterly ambition, this Logic; a masterly Method, too, it would seem, this method of the "self-explicating Idea," carrying us from category

to category with an oily, if painful, sureness. But now that we have plumbed the riddle of the Idea as *prius* let us away to the concrete of Nature and mind. And what do we find? That the Reason into whose very movement we had seemed to enter, now often plainly avails us nothing. We cite pessimists galore who point to the interminable failures, abominations, and torments of this world, and are told in reply that these evils are mostly necessary to bring out the full glory of the godhead of the Idea. But some evils at least are utterly indefensible on any such teleologic lines; so Hegelians call in an ally and eke out Reason by aid of the sound "contingency." No one, however, is able to say *how* Reason, the all-sufficient *prius*, founded a world of "contingent" particularity which so often suggests unreason, but that for Hegelians is a trifle. Suffice it, they urge, that we are able to detect the presence of Reason here and there in the turmoil. We are to trust to the wisdom of the Idea that the pother will make eventually for good—the good *of the Idea*. Of a truth Nature on the showing even of advocates of the IDEA is a very bad exemplification of Reason. To cite Schwegler's description of the Hegelian Nature, that amazing output of Rationality: "Nature is a Bacchantic God, uncontrolled by, and unconscious of, himself. It offers, then, *no example* of an intelligibly articulated, continuously ascendant gradation. On the contrary, it everywhere mingles and confounds the essential limits by intermediate and spurious products which perpetually furnish instances in contradiction of every fixed classification. In consequence of this impotence on the part of nature to hold fast the moments of the notion, the philosophy of nature is constantly compelled, as it were, to capitulate between the world of the concrete individual products and the regulative of the speculative idea" (*History of Philosophy*, translated by Hutchison Stirling. Eighth edition. Page 332). Seeing that the Idea as *prius* is viewed as *pure reason* and nothing else, and further as *in no way exhausted* by its manifestation as Nature, we must be at a loss to account for the above extraordinary output. And our perplexity is increased when we reach the sphere of "Philosophy of Mind" or Spirit—the very inquiry which, treating of the regress of the Idea into itself, might be ex-

pected to shatter scepticism. It would puzzle even a sophist to exhibit the domains of (what Hegel discusses under) "Anthropology," "Phenomenology," and "Psychology" as of purely rational import. So-called "Objective Reason," again, as realised in the State, etc., would be often much more appropriately dubbed unreason. At its best it is only an imperfect result of innumerable faulty tentatives. And even in the vaunted history of philosophy itself the Categories of Reason show but poorly. There are apparent "distortions in time," big gaps, etc., on the admission of Hegel and of his own supporters, the deftest manipulations of data notwithstanding. Here again phenomenal "contingency" destroys all hope of any concrete vindication of what logic—rightly held the "realm of shadows"—has established. Yet Logic pretends to discuss the *Prius* of that very contingency and believes itself to have done so satisfactorily! We can appreciate now the indignation of Schopenhauer, and the sneers of Schelling and von Hartmann. When unravelling the real ongoings of the real world and of the minds of those conceived as in it, the so-called labor of the "Notion" or "Concept" only fools us. It is simply inadequate to the mere facts—is a product of the study suitable for stuffy class-rooms but unable to thrive under the open sky of concrete reality. It no more displays the workshop of this reality than do printed words in a geography-primer the actual geologic origin of the countries discussed. Truth to tell, the assumption that the source of reality must be Intellect ("Idea"), the articulation of which can be shown in a book, is an absurd relic of Platonic dialectics and Scholasticism which but for the dexterity of one or two German writers would long since have been discarded.

But if Categories, Notions, or Concepts of the Metaphysical kind make so strange a show, why in the name of common sense, it will be asked, were they ever assumed at all? How are they seized in the first instance—the problems of relating them in a Logic, etc., apart? Here we come to an important issue, an issue which enables us to clear the ground grandly. The answer, of course, of Hegelians would be—no such categories, no experience, inner and outer, mental and perceptual, such as we actually have. This be-

ing so, I will first take the case of *Objects*, of "outer" experience and contend that the objectivation of this latter in no way requires us to assume such categories. In other words, Categories, as devices invented to help us to explain the riddle of External Perception, are superfluous. We can explain that portion of the riddle, which they seem to explain, otherwise.

Take the alleged *Category* Being—is it requisite as most simple of the thought-determinations said to "constitute" the object? I reply, it is wholly superfluous; Being in the object is not a thought but a sensation, not a category, pure concept or universal, but a name for the feeling of *self-opposition* (Behmen's contrariety), whereby the subject becomes conscious.[1]

The idea of this *sensation* abstracted from the ideas of the other sensations along with which it is had, and fixed by a name becomes in the process a concept. The Subject does not "*think*" its states as existent under a metaphysical or "*transcendental*" concept and so constitute a rudimentarily objective world, but it derives the *empirical* concept "Being" from a *felt* world, with the production of which concepts had nothing to do,—the production being due to a superrational activity in no way resembling intellect. The new Monadism, the quarter in which I believe the true explanation of External Perception to lie, has no need to invent transcendental concepts to account for knowledge. It declares that there are no concepts whatever in things until by "taking together" (con-ceiving) the agreeing phases of the things, we generate them and *then place them* at our leisure in the selfsame things.

There is, in fact, a *native objectivity* in sensation arising from its mode of production, the rushing of the Ego or Subject into manifestation. I am glad to find myself partly in agreement with Mr. Belfort Bax on this count. He, too, though a Categorist, dismisses Being as "alogical," but he does not, I venture to think, yet realise what this important rejection means. It means the concession to the presentation-continuum of that precious objectivity

[1] Jacob Behmen's "doctrine of contrariety" as essential to consciousness, and Fichte's view of the Non-Ego as an output of the Ego, which thereby determines or makes definite itself, may be usefully studied in this connexion.

which is the one element requisite for the success of Associationism in this quarter. Mr. Bax says: "The universal and necessary element which all reality involves is clearly thought into the object. Yet although thought into the object, it is clearly not thought into it by the individual mind, since the latter finds it already given in the object" (*Problem of Reality*, p. 17), and preserves categories, such as Causality and Substance, despite his objection to Being. But surely, Being once conceded to the enemy, the case for the other categories is lost. Association will suffice to round off a crudely into a fully objective world, and that the more easily as inherited ancestral experiences facilitate its task. As I have urged elsewhere: "Not categories, but cerebral monads mediate the fuller objectivation of sensation into the ripe world we know; their activities being passively duplicated in the Subject [central monad] as the infant consciousness dawns. *Nerves and brain wirepull the adjustments of organism to surroundings, and the reflex of this adjustive mechanism in the subject is the very process of the fuller objectivation itself.*"[1] Seeing that for Mr. Bax consciousness viewed from the physical standpoint is "cerebral matter in motion" and arises with the organism in time, he might find the above view not wholly valueless, friendly though it is to Monadism. It is satisfactory, however, to be in a position to assert that my particular form of Monadism admits of inductive proof, a proof which can be readily adduced if required. Indeed, saving certain effective supplementary arguments yet to be inserted, this proof has been already submitted to the critics.

It is well that I should ward off misrepresentation in thus treating of the categories. I was recently taken to task by a careless and I fear not too conscientious critic for insisting in one part of my *Riddle* on psychical atomism and in other parts attacking it. "You cannot," urged this worthy, "get universal connexion out of particulars in which it was not, but, as Mr. Fawcett shows, there are no such particulars in experience (p. 90), and all that science can do is to clear and make systematic a connexion present from the first in every associative conjunction. If therefore (p. 182) the

[1] *Riddle of the Universe*, p. 337.

author accepts Mr. Bradley's rejection of atomism he can hardly have understood it. Particulars out of connexion *are* psychical atoms." The critic has not cared to think out the standpoint he so glibly assails. I reject, of course, as a Monadist, all show of psychical atomism proffered as explanatory of my own consciousness, but I equally reject what seem to me those phantoms of the study, those modernised verbal Universals known as "categories." What I posit is a presentation-continuum, the "wholeness" of which reveals the unity of the monad that evolves it. From this whole I maintain that we can derive universals and particulars alike; integration and differentiation of its *aspects* by way of their mutual furtherance and hindrance furnishing the clue. Physiological psychology taken over and made adequate by Monadism enables us to dispense with the category. It should be evident that this view excludes belief in primitive unrelated particulars. All modes of experience are related as modes of a unitary self-revelatory monad. The error of Hegelians is their view of "relations" as the realisation of "Universals" somehow different in kind from the "related terms." I will return to this matter anon.

Let me now glance briefly at the well-known Category of Causality as impugned and set aside by the new Monadism.

What is the pre-Hegelian history of this Category? It is this. Hume in the first place resolved experience into primitively unrelated particulars—shook the whole fabric loose. A causal sequence for him was a time-sequence, the terms of which *seem* to hang necessarily together owing to association. Causality is derivative from our experience of "constant conjunctions" and then thrust, as it were, illusively on some special conjunction. But Kant changes all this. He argues in effect—no causality latent as *pure concept*, no experience of the conjunctions in question at all. It is by way of subsumption under the Category (or rather its *schema*) that determinations of phenomena, i. e., space and time ordered sensations, become objective, universally, and necessarily externalised phases of a real perceptual world. The category minus the phenomena is empty, but the phenomena minus the category are blind. This is the Thought-Theory of Experience, and at first

sight it certainly does seem attractive. But analysis reveals a grave blemish. It was supposed that the Category carried with it a necessity that recemented the fragments into which Experience had fallen for Hume. But see—Kant posits "phenomena" as material for the work of the category. How comes this material into the shape it bears ere it is "subsumed" under the Category. Aye, there's the rub. A is followed by B, and into this *given sequence* the category reads Necessity.[1] But what of the origination of the terms of the sequence thus treated? Why was A presented along with B in this order? Kant cannot tell us. To say that sensations or "representations" are intuited in a Time-Form is in no way to account for the *detailed order* in which they appear. To explain that order we must surely fall back on the activity conceded to the "transcendental" objects or things-in-themselves. And may not a contingency of at any rate considerable import obtain here? May not the "transcendental objects" or *causæ φαινομενῶν* produce our sensations at random now and then? If so, what is to prevent "Causality" from bestowing a necessary relation on terms arbitrarily, and, may be, contingently originated? Superimposed necessity is a farce. Kant, in short, has on this count failed to confute Hume. Hume's Causality is of *Empirical* origin, the child of "Association"; Kant's is an *a priori* condition of experience, but both these kinds of Causality alike presuppose *relatable terms*, in the origination of which contingency may well obtain. The net of the Category is only thrown over two or more terms that happen to have bobbed up in a certain order.

Hegel and others seem to have recognised this as well as other defects of Kant's theory of Categories. Hence Causality is again revised. It is now made immanent or implicit in phenomena (tardily though we empirical individuals may come to detect it). But in this novel scheme Kant's standpoint is practically abandoned. Kant had clearly started with a wish to exhibit *multiple* phenomena as somehow thrown at the Ego and then rallied into order by sub-

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[1] This inreading is, also, most notably prominent in the case of the so-called categories of *Quantity* and *Quality*.

sumption under a *unitary pure* concept.[1] But when Causality is viewed as immanent in the phenomena at the start, it loses its Kantian standing, being transmuted into the extraordinary fiction of a Concept as *multiple* and *impure* as there are phenomena "realising" it! Kant's mere *function* of the "Transcendental Judgment," designed simply to account for the way in which we "think" given phenomena, is superseded by a *Logical Realism* which has to account for the phenomena themselves. The Concept in the *Critique idly* related what was *brought to it*—now it *energises and manifests in things.* Is this alleged advance on Kant worth penning? The Category in the form in which Kant championed it will not pass muster—has it profited by taking on a new form? Is it easier to understand how B follows A, always and unconditionally, just because a mere Concept is held to relate them immanently? The supposition may be impeached on two main counts: (1) Concepts of the empirical kind which are alone generally admitted are not *dynamic*; why, then, is a transcendental concept to be gratuitously supposed dynamic? Surely if Reason is found incompetent to account for the movement of Reality, as a whole, specially incompetent is this wretched concept Causality to account for the *nisus* behind the myriads of caused events in this world. The dynamics of Reality were doubtless incorrectly fathered by Schopenhauer upon "Will"—an abstraction as empty as is Reason—but his indictment of Hegelian rationalism holds none the less valid for that. (2) The seething *complexity* and *multiplicity*, the wealth of *qualitative variety*, which mark Nature raise further difficulties. On the Hegelian supposition that the *prius* is pure Reason, articulated as in the Logic, the only way of accounting for Nature is to view it as the categories of this pure Reason made concrete, "realising themselves in multiplicity" as the phrase goes. I would as lief try to create a flesh-and-blood man out of a shadow as spin Nature out of such figments. Causality, of course, is made to

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[1] The categories, observes Kant, are "nothing but the conditions of thinking in possible experience" in the same way as space and time are conditions of the phenomena which get "subsumed" under these categories.

play its part, the IDEA "thinking" innumerable cases of sequence as causal. It is forgotten that the important thing after all is *not that events are, or may be, related "causally" in the "thought" of the "Idea," or of you and me, but that they occur.* The *bare occurrence* is the point of moment and this occurrence could be effected as well by a *super*-rational Prius as by a rational one such as Hegel's.

This problem of the bare occurrence is, of course, of a piece with that touching the source of "sensation" (the alogical so called) as a whole. To squeeze "sensation" out of Concepts is as impracticable as to derive Nature from Plato's bloodless Universals. I may, however, be asked: "have you, then, any satisfactory theory to proffer?" It is not, however, my business here to construct, but to criticise. I will therefore simply say that in my humble opinion the solution of the riddle of sensations must be sought by way of study of the dynamics of Monads; Monadism incorporating, while interpreting, whatever physiological psychology has to say.

Some way back I was contending that psychical atomism has no necessary connexion with repudiation of Hegelian Universals. And now I must add that "Relations" *where truly primitive* need in no way be *specially* exalted as "Thought." There are, in fact, sensations of relation—"transitive parts" of the stream of consciousness to adopt Professor James's phrase—as well as the ordinary recognised sensations or "substantive parts"; both transitive and substantive parts being aspects only of a Monad. The Relations puzzling the Categorist and treated by him in such absurdly heroic fashion are no "Intelligible" orderers of the manifold, but "sensible" phases of the latter on an equal footing with other phases. As such they are *particular* themselves—that is when we dig them out of their context and come to consider them abstractly. And all particulars (as universals) are products of this later abstraction.

Categories, then, in one domain are superfluous, are relics of Logical Realism. If we could not explain External Perception without them, reconsideration of the group would be requisite—but we can. So far so good. But the Dialectic is a chain which cannot afford to have one weak link. Along with rejection of categories in the realm of Nature and Sense must go rejection of those cate-

gories supposed to interpret Nature and Sense. Dialectic cannot begin abruptly where we think about the world we perceive. No longer, for instance, need we view physical science as the "discovery by the human mind of thoughts that are objective in sensible things"—*provided that "thoughts" here mean Concepts made concrete.* The so-called "laws" of nature present no difficulty. They are verbal generalities, and of some, e. g., the first law of Motion, it cannot be said that phenomena exemplify them sensibly at all. Science, indeed, as a whole does not mirror concrete aspects of the concrete given Real, but stands for a conceptual transformation of this Real, wherein names and symbols predominate. Its Generalities only indicate the likenesses and unlikenesses of minor generalities, "outer" facts or "inner" ideas and feelings viewed in aspects mostly relative to our interests, practical, and other. They leave the problem of the *power behind the facts* untouched. They are necessarily inadequate even to the facts and apt to cheat the book-lover with the merest shadow of knowledge.

Touching the rise and growth of intellect, Monadism must again be invoked. But nothing useful can be done unless physiological psychology and evolutionist biology are first called in. It seems clear that the opinion of Schopenhauer is justified by the advance of science. Intellect uprose primarily as servant to the organism, and was conditioned wholly by its needs. Knowledge pursued as end-in-itself is now familiar, but stands for a late stage in the self-assertion of the central monads. Interests, too, rule here, and we note the *absence of uniform logical order* in the modes of self-realisation of these monads. The bearing of Monadism on the standing and development of "Reason" (or rather of those modes of co-ordination of states of consciousness embraced under this general name), is necessarily of high interest and all conclusions of ordinary research, biologic and other, must be overhauled by it previous to adoption. Ordinary science, where really a study of "phenomena," and not, as is so very often the case, an unconscious and blundering Metaphysic as well, deals with surfaces; monadism with the veiled activities which seethe beneath these surfaces. How penetration below these latter is possible I have shown at

length elsewhere;[1] here I must simply reiterate my conviction that the inquiry is both feasible and of leading significance.

A word more on Dialectic, the supposed "method of the self-explicating Idea" as echoed in human thinking at its maturity. The self-diremption and self-movement of the concept is its presupposition. Let us place our fingers on the fallacy underlying it. Dr. Stirling has a doubt as to the validity even of the *Logic*. "If the start be but an artifice and a convenience, is it at all ascertained that the means of progress, the dialectic, is any respect better?" Now we may at once vindicate this timely doubt. The truth is that the contradictory moments discerned within concepts—"the knowledge of opposites is one"—are not products of their self-diremption at all. Contrariwise the moments were otherwise posited and merely suspended together by us *in and as* the concepts. In other words, the alleged self-movement or "labor of the Notion" is an illusion; the true movement is ascribable to the primitive non-conceptual phenomena, "outer" and "inner," aspects of which concepts merely indicate. *It is just this flux, stir, and life in phenomena that constitute the real* CRUX *of Metaphysic.* And here, again, I would suggest that recourse to Monadism is imperative. The seemingly energising concept is an impostor credited with the energy of the phenomena it grew from.

The two-sidedness *at least* of cognitions is generally admitted. It is no special privilege of Dialectic to maintain that A is only A in virtue of not being B, etc. Thus even empiricists may agree with Bain when he urges that the two sides of consciousness "mutually constitute each other." Such views do not further adoption of conceptual dialectic as the world-secret; they have other uses also. A is certainly B *in so far* as B makes it A. Any given mode of consciousness is differently realised in different relations. But between this contention, and the contention that concepts by self-negation, etc., run a universe, yawns a gulf hard to cross.

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[1] Cf. *Riddle of the Universe*, Part II., Chapter IV. and V., and elsewhere.

And now there must be noted another leading objection to certain current statements of idealism, including panlogism—to their swamping of the individual subject or monad in the interests of a supposed unitary subject of consciousness "in general." With Hegel the Idea as *prius* is a Unitary pure *reason*; with others who sympathise with him in a manner the *prius* is equally a *unitary* subject of consciousness in which numerical differences, such as empirical subjectivities exhibit, are lost. Thus Mr. Bax urges that "we instinctively feel that the that in us which distinguishes between the object self [mental order] and the object not-self is the subject of consciousness-*in-general* of which self and not-self are the determinations."[1] I am afraid that this alleged instinct is an endowment of certain philosophers misled by the worship of Universals. Doctors, however, disagreeing, we must fall back on Experience. And Experience acquaints us with states only of our own consciousness, i. e., ourselves. It is doubtless convenient to "deduce" individuals from a Subject (logical, superlogical, etc.) in which multiplicity is not; but the deduction, like other feats of the Speculative Method, smells of the study. Say what one will, the fact remains that "selves" or monads as partially revealed in our experiences are "impervious," that the I-glow, the individuality of the individual is self-posited and recognised by men, with no system to uphold, as such. The name subject-in-general may indicate a genuine potentiality or background, but whether we admit the latter or not, we must at any rate admit multiple selves. "If the words 'self,' 'ego,' I, are to be used intelligibly at all they must mean whatever else they do or do not mean a 'somewhat' which is self-distinguished not only from every other knowable object, but also from every other possible self" (A. J. Balfour). Here the multiplicity or monad-view stands to its adversary as does fact to problematical inference. Of a *merely* monistic ground we know and can know nothing; but in our individual monads we the conscious thinkers are rooted. I have argued, however, elsewhere, that the

[1] *Problem of Reality*, p. 87.

truth lies in a monistic monadism wherein both sides of the controversy receive recognition. On these lines the ultimate ground of consciousness is not a mere *Unity*, but a *Unity-Plurality* in which all possible numerical diversity is latent or implicit. The individual, in respect of his bare individuality, at any rate, is an *educt* not a *product*. To say that number obtains *explicitly* only in the sphere of the empirical is correct, and were Mr. Bax and his sympathisers to confine themselves to upholding this view, no one need quarrel with them. But the diversity that we know as *explicit* presupposes a ground in which it was *implicit*; otherwise it could not appear at all. It is a prominent Hegelian contention that there is no "appearance" without an "essence" and no "essence" that cannot become "appearance." The admission, while valid, is embarrassing. The "appearance" of numerical diversity in individuals must in consistency be viewed as explication or revelation of numerical diversity in the "essence"—the Universal Subject or Spirit. A *merely* Unitary Subject could not *unfold itself* into a diversity that it never possessed!

To those who dread the unreality of the "labor of the notion," a labor that yields chronic diseases of language, the very name of Metaphysic is apt to prove obnoxious. But to condemn Metaphysic on account of the vagaries of some of its exponents is unwise. And after all, most of us, man of science and votary of common sense alike, are metaphysicians in practice and it remains, therefore, only to determine the best way of organising and testing seemingly inevitable thoughts. The "complete" Inductive Method of Mill may be heartily commended as an instrument for effecting this latter end; the superstition that it is only suitable for ordinary physical and psychological research being dispelled by the results to which it may be shown to lead us. But, be our method what it may, *we must at least take care not to misstate the riddle of the Experience we have to solve.* Experience, let me repeat, is silent as to the Subject "in general"; it reveals "selves" as discrete, the individuality of the individual as self-posited. This supreme fact must not be ignored. *Δὶς καὶ τρὶς τὸ καλόν*—I am the reality I am aware of, the world is *my* presentment in even a stricter sense than that intended

by Schopenhauer.[1] Of course the idealistic solution of External Perception—the reply to the question how and why is my sense-consciousness produced as I have it—involves inquiries into the ongoings of other monads, but of these ongoings our knowledge must be indirect.

Such, then, are some of the objections which bear, or seem to bear, severely on Hegelianism. All could without doubt be extensively elaborated, and more especially the pessimist indictment of panlogism could be drawn up with far greater effect. The force of this latter in the sphere of "Nature-philosophy" and in that of Hegel's "Objective Reason" in "Philosophy of Mind" is indeed overwhelming. The systems of Schopenhauer and von Hartmann, if too one-sided, are themselves witnesses to the incompetence of panlogism when it descends from the Olympus of Logic into the Hades of actual fact. Much embodied in these systems is unanswerable on current idealist lines and calls for the radical reconstitution of metaphysic. That reconstitution, I believe, and elsewhere I have endeavored to make good my assertion, can only be achieved by abjuring Reason as *prius*, and resorting to a *super*-logical, consciousless, but spiritual, spontaneity—to a *monistic monadology*. It seems probable that in this event many of the riddles of this world, pessimism, the ethical problem, the import of the individual, and so forth, might ultimately come to wear a far more encouraging aspect than they do now.

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Having dealt with the Hegelian panlogism, I take this opportunity of passing some remarks on the "form of panlogism" espoused by the editor of this magazine, and expounded in its general outlines in his lucid and compact *Primer of Philosophy*. Space

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[1] Schopenhauer, despite his Inductive standpoint, tends to cling to a "Universal" better suited to abstractionists and notion-philosophers—tends to strip his WILL of all inner multiplicity. Yet he very strangely says, "all proper and true existence obtains *only in the individual* . . . this immeasurable outer world has its existence only in the *consciousness* of knowing beings and is consequently *bound up with the existence of individuals which are its bearers.*" *Selected Essays*, E. B Bax, p. 177. Why, then, ground these individuals in a mere unitary Will?

will compel me to consider only its broadest features, and also to ignore many of the points, touching which I am in hearty accord with its author.

Dr. Carus combines a bold empiricism with a quite Hegelian recognition of a World-Reason as the *prius* of mere human perceiving, feeling, and reasoning. Indeed, he strives after "a critical reconciliation of rival philosophies of the type of Kantian *apriorism* and John Stuart Mill's empiricism." All our knowledge flows from experience, but Reason—an "objective" or World-Reason, not "subjective" innate concepts or the like—is the source of this experience and the universality and necessity detected in the relational or formal aspects even of sensations are to be cited, he thinks, in proof of this view. Needless to say that Mill's associationism is a bar to the reconciliation favored by Dr. Carus; hence the latter's treatment of the question of "formal thought" is notably antagonistic to the standpoint of the famous British empiricist. But there is no reason whatever why a thoroughgoing Empiricism should not, with certain modifications, be made perfectly consonant with an Absolute Idealism or Rationalism. Aristotle, who, if not an Absolute Idealist, was well-nigh one,[1] was at the same time an empiricist in so far as the problem of the origin of *human* knowledge in time was concerned.

But though Dr. Carus agrees with Hegel in the belief that Reason is sole *prius*, he is in no way inclined to favor the artificiality of that thinker and his repudiation of the Dialectical Method is obvious from the remark that "the inmost nature of reason is *consistency*, and thus the simplest statement of rational thought is the maxim of sameness formulated in logic in the sentence A = A" (p. 109). Rejecting the Dialectical Method, he rejects apparently with it all hope of *articulating* the rationality immanent in the world-order, the leading ambition, without question, of Hegel. Indeed, failing some such method, I do not see how the attempt would be feasible. Even if, as Dr. Carus urges, "human reason is

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[1] "Well-nigh;" because his ὕλη or "matter" remains in the last analysis a d, never wholly resolved into the IDEA or "form."

only the reflexion of the world-reason" (p. 117), we are still at a loss to understand how *immanent necessity and connexion* obtain between the moments of this World-Reason, and why it should actually unfold itself just as it does. We must take the unfolding, it appears, as an ultimate fact and abandon all attempts to pen a Logic which shall be one with Ontology.

But here I must advance a criticism which seems to me to possess much force. How does Dr. Carus, lacking a Dialectical Method, know that the World-Spirit which reflects itself in us is *really rational at all?* The Universality and necessity alleged to pervade experience may surely be witnesses not to the mere rationality of the world, but to the workings of a *supra-rational,* spiritual Power? Remember "reflexions" are often of a very faint and misleading character. And it will scarcely be urged that we men, who are not so very far removed from the animals, furnish a *reflecting surface* in any way adequate to the activities of an alleged World-Spirit? May not the processes we term "reason" be merely a transient phase of our becoming—a wretchedly faint reflexion of spiritual activities such as altogether transcend reason? The moonlight reflected at midnight by a murky pool is no worthy representative of the splendor of the sun which is the original source of the light. And poor human reason, I take it, is no worthy representative of the splendor of that *supra-rational* spiritual sun which I have elsewhere termed the Metaconscious. Anyhow the supposition is worth considering.

Dr. Carus terms his standpoint a "monistic positivism," and very properly contrasts it with the mere agnostic positivism of Comte and Littré. He also justly assails the pernicious *ignorabimus* of modern agnostics in general. "The philosophy of these latter days is indeed like a ship run aground. Her helmsmen themselves have declared that further headway is impossible; that philosophical problems in their very nature are insoluble." For "philosophical" I should prefer to write "metaphysical" or "fundamental" problems. Philosophy is flourishing well enough in these latter days, but metaphysic until recently has certainly been at a discount. Still we have a stalwart, if small, crew of metaphysicians

to man the ship even as things stand,—are not the followers of the Germans from Fichte down to Von Hartmann of some account? The Oriental metaphysicians, also, have their followers. But undoubtedly the agnostics and indifferentists poll by far the biggest vote, and I agree with Dr. Carus that the fact is in almost every way to be deplored.

The *New Positivism* represents the excellent principle "that all knowledge, scientific, philosophical, and religious, is a description of facts." "Laws" and concepts merely refer us to aspects—qualitative, quantitative, etc.—of the concrete real. "The natural processes themselves are reality." Exactly. *Monism*, it is urged, is the unitary conception of the world, explaining all facts as phases only of one principle, and opposed to the *Henism* which tries to explain facts by way of some one-sided agency, "matter," etc., borrowed from them. The true explanation must include all facts and not give undue preference to any abstractly viewed set of them. With this I am in hearty accord. But the question arises whether such a Monism is adequate to the situation. The world exhibits not only unity but diversity and we must surely not allow the diversity to be ignored when we discuss the *Prius*. Indeed, the all but universal struggle for existence suggests discreteness *as well as* unity as present in the all-evolving World-Spirit, and it is a *monistic monadology* that I would venture, accordingly, to proffer as the explanation most adequate to the situation. A mere *unitary* Principle is by implication without the germs whence sprout the *Many*. And let me add that the Experience on which Dr. Carus lays such stress invariably exhibits us to ourselves as impervious, self-contained centres of consciousness. However, I have dealt with this point previously.

Dr. Carus holds that the truth of a philosophy may be vindicated by its ethics; by the fact "that people can live according to the maxims derived therefrom." Surely this view validates the most conflicting standpoints of Asiatic and European philosophy, all of which cannot be true since on the author's own showing, the "inmost nature" of reason is *consistency*! But waiving this point, I pass on to the ethical ideal which Dr. Carus derives from "sys-

tematised *facts*," to-wit Meliorism. Now Meliorism, of course, is not pessimism; nor again is it a modified optimism. In fact we are told, "That life has *no value in itself*; life is an opportunity for creating values. Life gains in value the more we fill it with *worthy* actions." Meliorism says that it is only prosecution of a moral end that makes life "*worth* living" (p. 6). This devotion to duty is exactly the ideal which inspired the ethics of Fichte, nay, which caused him to represent God as the "moral end" of the universe, as the Absolute Ego triumphant over the non-Ego of its own making. But let us consider this ideal in the present regard.

Turning to page 22 I read, "Errors are children of the mind. There is *neither good nor bad, neither right nor wrong*, neither truth nor falsehood except in mentality." For what then ought the Meliorist to sacrifice himself when he undertakes, let us say, to advocate some great reform which will advance the civilisation of the future, a lofty ideal if ever there was one? For his fellows? Certainly not. Dr. Carus assures us that "progress is accompanied with increased sensibility to pain, so that the average happiness is not increased even by the greatest advance of civilisation" (p. 6). For what then? For the "moral end" of the universe as Fichte would have said? Certainly not, for right and wrong, good and bad, *only exist in our mentality*. It appears, then, that the Meliorist is sacrificing himself merely to a figment of his own imagination, a barren thankless ideal of his own making. Self-sacrifice for the humanity of the future *when that humanity cannot benefit by the act* and there is no moral ideal beyond our own minds to take account of, is surely a huge mistake? Why labor to no purpose? For my part, were I a meliorist in theory, I am afraid that I should prove a very sorry *décadent* in practice!

Meliorism is said to found on "systematised facts," but where, I ask, are the facts? Is it true that life has no value in itself, are there no enjoyments which merit the name, no intellectual pursuits which are attractive enough to be *ends-in-themselves*? Again, life is said to be merely a chance for creating values? But values *for whom*? For ourselves and fellows? No: for meliorism does not find the value of life in reaping pleasures. Nevertheless, a "value"

that does not relieve pain or produce, or tend to produce, pleasure is a thing which I for one confess myself at a loss to understand. The term, in fact, seems meaningless. And similarly the expression "worthy actions" puzzles me. If there is no right outside human minds, and if the giving of pleasures and removal of pains are not the test of worth, what is the meaning of the expression at all? What is the standard of comparison by which all men alike will be content to measure "worth"? To me the only available standard seems utility and this consideration imports, of course, calculations touching the assessment of pleasures and pains.

Very serious in its bearing on morality is Dr. Carus's attitude touching the soul. He views soul and body as inseparable, as abstracts from the same reality. That is to say the activities which to other sentient beings appear as certain cerebral functions are for me my own conscious life ; neurosis and psychosis are two sides of one and the same process. Well : this view implies the extinction of my consciousness at death ; for the neurosis is then at an end and there is no psychosis separable from a neurosis. Now, I hold with Renan that the loss of the belief in immortality must enervate the morality of, at any rate, the ordinary man. Unless we are to persist consciously after death and that too with a prospect of happiness, it really does seem absurd to worry ourselves with arduous moral efforts here and now. Unless the higher phases of self-culture and altruism are to bear rich fruit for ourselves AND OTHERS in another life or lives, I fail entirely to see why we should vex ourselves here with ceaseless strivings and strugglings, when the cozy nooks of degeneration lie open to us. I am aware that Dr. Carus holds that "true religion is based upon the immortality of the soul" (p. 189), but what is the immortality in which he believes? A mockery in all seriousness! It cannot be that he refers to our *conscious* existence after death, because the body is destined to perish, and body and soul, he asserts, are inseparable. "Christ is actually a living presence in [European] humanity," he urges, pp. 188–189. No, no, not so fast. The Nazarene's body has long ago mouldered into dust, assuming that he ever lived. His soul, therefore, on the lines of monistic positivism has been extinguished.

What is "present in humanity" is not Christ, but *ideas about* Christ, which is a very different matter. For myself, I would not give twopence for an immortality of this kind, and I have no doubt that the average man in the street will heartily echo my sentiments. What is wanted is not a *metaphorical* existence in somebody's mind, when that somebody happens to think of you, or somebody's character has to be moulded, but a *real conscious* perpetuity in one's own right. Anything less than this is of no account to its possessor.

To turn to the subject of Idealism, I note with interest that Dr. Carus views "all objective existence" as *in itself* subjective, "that which appears to us as a motion is in itself either a feeling *or something analogous to feeling*." Exactly; this is the point on which I have laid such stress in working out my theory of the Metaconscious and the new Monadism. The truth is that Subjectivity has many grades, of which what we term reflective self-consciousness and the ordinary direct consciousness are merely two—of special interest to us owing to our position in the universe. As observed by our author, "let us observe and study natural phenomena, and we shall learn something of the souls of other creatures *and things*" (p. 22). Yes, but it is just in observing these domains that I found my *lower monads*, the *very "souls"* of creatures and things, which Dr. Carus himself is here on the verge of admitting! Our author is, as I know, no friend to Monadology, but he has very nearly stumbled on it here.

I am quite in accord with the author in condemning the "sham" or Mâyâ theory of perception held by so many Hindu thinkers. Nature as we perceive it *is* a revelation, though the activities in our consciousness need not be viewed as more than symbols of the spiritual activities in that wider Nature which lies beyond our consciousness. In my *Riddle of the Universe* I have dealt with this and like points at length.

I think that Dr. Carus unduly narrows the meaning of Idealism when he regards it as the school that questions the "objectivity of our representations." Idealists are of many schools; agnostic, nihilistic, subjective, objective, absolute idealists, etc., are to be met with. The only idea common to these schools is the belief that in

consciousness or in activities akin in nature to consciousness must be sought the entire explanation of the universe. Theories of perception, termed idealistic, differ widely.

There is much in Dr. Carus's tersely written *Primer* on which I should like to dwell, but I must perforce at this point bring my already too lengthy remarks to a close.

EDWARD DOUGLAS FAWCETT.

TORQUAY, ENGLAND.

PANLOGISM.

IN REPLY TO E. DOUGLAS FAWCETT.

INTRODUCTORY.

EDWARD DOUGLAS FAWCETT has earned a well-deserved reputation in two fields—*belles lettres* and philosophy. He is a novelist of great force, and at the same time a philosopher who has become widely known through his book, *The Riddle of the Universe.* In the latter he combines the elegance of a novelist with the keenness of a thinker, and shows himself excellently well versed in the history of philosophy. His results differ greatly from mine, but that does not prevent me from recognising his unusual abilities, which manifest themselves again in his present article, "From Berkeley to Hegel" (pp. 41–81 of this number), and I am specially indebted to him for honoring me at the close of his expositions with a critical consideration of my own views. A man of his compass deserves a hearing. I have, therefore, weighed his objections, and propose to make a few comments in reply.

Mr. Fawcett has read my *Primer of Philosophy* and various *Monist* articles of mine, but, interpreting them in the terms of his monadology, which is his scheme of thinking the world, he misconstrues the import of my propositions concerning the moral aim of life and the immortality of the soul. The main point of contact, it appears, lies in the principle, which we both recognise, that (as he expresses it) "in consciousness, or in activities akin in nature to consciousness, must be sought the explanation of the universe." But our roads separate at once, for, taking this premise, Mr. Fawcett jumps at the conclusion that the nature of soul-life indicates

the existence of soul-monads, who then are made responsible for the continuity of soul-evolution and the relative stability of the spiritual phenomena of life. I may misunderstand Mr. Fawcett's theory, but when I hear the word monad, I think of a unit-centre, either of matter or of force, and there seems no doubt about it that Mr. Fawcett means to convey some such idea, for he speaks of souls as "impervious self-contained centres." Of what use the idea of a monad, of an impervious, self-contained centre, can be in the explanation of soul or consciousness is more than I can say. What has imperviousness to do with thought? Imperviousness is a quality of material objects, but not of soul, or spirituality, or mind. Monads and minds, centres and souls, have as little in common as atoms and ideas.

In order to reply to Mr. Fawcett's criticism, we must go over a good deal of ground, for he touches the most important problems of philosophy. We must ask: (1) What is soul, or spirit, or mind? (2) What is reason? (3) Does the unity of consciousness and the identity of personality prove the existence of monads? (4) What does immortality mean? and (5) What is the purpose of life?

WHAT IS SOUL?

Mind, soul, and spirit, are synonyms; they are abstractions from the same reality with slight variations of meaning. We speak of soul when we think of the sentiments of a man; we speak of mind when we refer mainly to his rational powers and the interaction that takes place among his ideas; we speak of spirit when emphasising the significance and character of thoughts without reference to bodily conditions. We speak of the spirit of a book to denote its tendency and import, but we should not say that the book is ensouled, for it has no feelings. Should the expression be used, "there is soul in the book," we could only mean that it had been written by a man of sentiment, that the soul of the book is the enthusiasm which it is liable to rouse. While a book may bear the stamp of intellectuality, we cannot speak of the mind of a book, because the book is not active. It may contain thoughts;

but it does not think; it may present arguments, but it does not argue; it may be rational, but it does not reason. It cannot reply to objections which a reader may happen to make.

Assuming that the chemical elements are various forms of the same substance (which, according to the law expressed in Mendeljeff's series, is more than simply probable), and observing that the materials of which human bodies consist are not different from materials found in the air, the water, and the earth, and also in the stars, we come to the conclusion that the conditions of sentiency from which the soul takes its origin are a feature that is an inherent quality of all existence. The sentiency of a man is not inserted into his body, but is the inner aspect of his bodily organisation. It is the subjectivity of his objective existence.

"Soul" is used in two senses. In a general and loose way it means the entire subjectivity of man, as which it is a synonym of spirit and mind. In a special sense the word is distinguished from, and sometimes even contrasted with, mind and spirit. By "soul" in a general sense we understand the system and sum-total of all the different kinds of feeling that animate a sentient organism; and every feeling is conceived as the exact analogue of some nervous activity. The peculiarity of feelings, such as we know them from our own experience, and their practical importance, consist in this, that they represent, symbolise, or denote the various things, relations, and actions with which they are severally associated. The forms of the various feelings depend upon the forms of the conditions under which they were experienced, and thus they appear as images of the surrounding world. They are subjective states of awareness and at the same time pictures of objective reality, and their memories, being aglow with life, make up the fabric of personality.

Sensations and memories remain in constant communication among themselves. By a combination of two or more images new ideas can be produced; the process of procreating new images being called imagination. The interaction that takes place among the various images or representations is called thought. When thought remains consistent with itself and in agreement with the possibilities of actual existence, it is called rational, when it begins to con-

tradict itself, irrational.[1] Thus reason is in the province of thought that same intrinsic necessity and harmony which in objective existence is the condition of the cosmic order as it appears in the regularities which can be formulated in so-called laws of nature.

When we speak of soul as contrasted with spirit or mind, we refer mainly to the sentiency of representative images; when we speak of spirit, we think mainly of their significance, and when we speak of mind we emphasise their rationality. That which pertains to sentiment is called psychical; that which has meaning is called spiritual; that which characterises the rules of the interaction that takes place among soul-forms is called mental.

WHAT IS REASON?

We do not now intend to explain the origin of soul, mind, and spirit, for we have done so over and over and again;[2] our purpose here must be to elucidate those points which are misrepresented by Mr. Fawcett. Suffice it, then, to repeat the definition that man's spirituality (his soul, his mind, his spirit) is a system of sentient symbols. Wherever feelings (that is to say, states of awareness) acquire meaning which is different according to the various forms of feeling corresponding to various forms of objective realities, there soul originates. Soul, or spirit, or mind, is neither an unknowable essence nor a mystical monad-entity, but a definite condition of being which depends upon definite forms of organisation, the characteristic feature of which is representativeness. A definite form of feeling is representative if it depicts, if it stands for, and denotes a certain reality to which it has become related and associated by repeated experience. The paramount importance of representativeness is obvious, for it is the representative value of feelings which renders adaptation to the surrounding world possible. In other words, while things devoid of mentality are at the mercy of circum-

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[1] The problems of the *a priori* and Pure Reason are discussed in *Fundamental Problems*, pp. 26–60 (Chapter "Form and Formal Thought") and in the *Primer of Philosophy*, pp. 51–117. See also *The Monist*, Vol. II., No. 1, pp. 111–120 ("The Origin of Thought-forms").

[2] Especially in the first chapters of *The Soul of Man*.

stances, mind acquires the ability of directing and marshalling the forces of nature and of making them subservient to certain purposes.

There are various degrees of mentality, the highest of which is the rational comprehension of man. This leads us to the next question.

Reason is, in its last and most practical aspect, the agreement of mental actions with the universal conditions of reality.

The most important feature of reality is its form. Existence in the abstract is a mere generalisation, and as such it is that feature which all existences have in common; accordingly, it is the same throughout. But the forms of things are that feature of reality which determines the suchness of actual existence in every case. Yet, while forms vary, the laws of form are invariable and universal. The idea of a thing-in-itself is pure fiction, but the conception of form in itself (of pure form or absolute form) is not only correct, but it is also a truth of great importance.

The most abstract forms of thought are logical and arithmetical relations, which can be developed by purely mental experiment. The simplest instance is afforded in pure numbers, as follows:

We posit a unit (by taking a step or marking it as a dot, or a dash, or a stroke, or whatever you like) and call it "one"; we posit another unit (taking a second step or making a second mark) and call it "two"; another, we call it "three"; again another, we call it "four." So long as we keep the same name for exactly the same operation, referring it to the same starting point, we shall, with the same operations, always arrive at the same results. The statement "$2+2=4$" holds good for all operations in which twice two units are added, whether it be a planet that makes twice two revolutions, or whether a boy plucks twice two apples off an apple-tree; under all circumstances the result will be the same; it will *always* be four.

Statements that hold good everywhere are called universal, and universality is the characteristic feature of reason. All the laws of reason are intrinsically necessary. If we speak of necessity in connexion with reason, we do not mean compulsion or coercion. The

immanent necessity of mathematics and logic means nothing more nor less than that its application is without exception; necessity in this sense is a synonym of universality. Universality is the most characteristic feature of reason. He who denies the universal application of logical thought-operations denies the existence of reason. A denial of Panlogism is a denial of the applicability of reason.

Reason applies not to any particular thing alone; it refers not to here or there only, nor does it describe the yesterday nor the tomorrow alone; it applies everywhere and at all times. Its nature is ubiquity and eternity. Reason consists of rules that formulate those features of the world which could under no circumstances be different—those which were the same from the beginning, those which would be the same for any imaginable world; it reflects the eternality of being; it even describes that which does not and need not evolve in the cosmic development; it reduces to exact terms what may fittingly be called the supernatural, for it mirrors that which applies not only to nature as it actually is, but to any other, to any imaginable kind of nature; it states those laws which would remain the same even though the whole world of actual existence were broken to pieces.

Kant is surprised to find reality in agreement with pure reason, and seems to take reason as the prior—that is to say, "as the prior to us," not *πρότερον φύσει* but *πρότερον ἡμῖν*. But the truth is that reality is first; reality is represented in sensation, and when analysed by abstract thought, it is found to possess a certain inalienable feature which conditions the cosmic order of the world and renders the formulation of its regularities possible, and reason—i. e. human reason—is nothing but a reflexion of this inalienable feature of reality in consciousness, and originates with the apperception of the universality of the law of sameness.

The world-order is the most important feature of existence; it is that which constitutes the divinity of the cosmos; it is the Logos of the Neoplatonist and the fourth gospel. It is supernatural because it is the condition of all possible order. It is what Mr. Fawcett calls the *Prius*,—not a *prius* in time, but in dignity; not an antecedent, but the supreme condition of all things. It is that through

which all events can be classified in laws of nature. Being in its ultimate analysis the consistency of sameness, it is the condition of rationality in the individual reason of human beings. It is that which makes mind and purpose-regulated action possible, and is the ultimate ground on which all moral conduct rests.

Fichte's definition of God as the moral world-order is not only intelligible but also sensible, but his proposition that God is the absolute ego is neither a practical idea nor is it tenable on logical grounds; it has no sense. The man who can tell us what "absoute ego" means has not as yet been found, although it is well known how Fichte arrived at his notion of the absolute ego. He started from an exaggerated idealism according to which the sole reality was his own ego; a proposition at which his students began to make their jokes, saying that Professor Fichte and Mrs. Fichte were the only two true realities in the world. And when Fichte surrendered his idealism he did not say there was no ego-entity, but that all the various egos of human consciousness were phenomena of the absolute ego, which is God. But the individual history of Fichte's philosophical evolution does not justify us in retaining a term which testifies to the previous errors of its inventor.

Mr. Fawcett would probably not regard the cosmic order as real unless it were a world-spirit, or ego-monad. But is his theory justified?

As it was difficult to understand that air exists, so it is the more difficult to prove that this immaterial presence of the world-Logos is an actual reality, omnipresent and eternal.

People who are accustomed to imagine that only that exists which is material are inclined to regard it as a non-entity; but it is more real than the gravity of stones and the resistance of solid bodies. It is not nowhere, but everywhere; not never, but ever. It is the most inalienable quality of being; it is the most real feature of reality, and if we do not appreciate its paramount importance it is on account of its very omnipresence and unalterable permanence. The attempt to conceive that which in its very nature is superpersonal, as an individual being, as a world-spirit or a world-monad, or as an absolute ego, is a misconception of its most important feat-

ure, of that feature which constitutes its supermateriality, supernaturality, and divinity.

UNITY AND VARIETY.

The unitary principle that is involved in the universality of law does not exclude variety. On the contrary, it involves it. As there are not two points in the universe which, in their actual relations to the whole, are exactly equivalent, so space, time, and materiality are "the germs whence sprout the many," not by haphazard but according to the law that, under different conditions, the same combination will be different according to the conditions.

Sentient beings become rational by comprehending the universal features of existence such as are expressed with precision in the formal sciences, logic, arithmetic, and mathematics. While there is no unfolding of the Prius, the Logos, the prototype of reason, there is an evolution of rationality in sentient beings; and this evolution follows definite laws which, however, are not yet fully understood.

Hegel regards the theory that every thesis begets an antithesis, and that the struggle between thesis and antithesis will lead to a synthesis, as the highest law of the evolution of thought, the doctrine of which he calls dialectics. He uses the theory of his dialectics as a Procrustean bed in the history of civilisation and philosophy, leading to many artificial conceptions and vagaries. But while Hegel's dialectical method has its faults, we are not prepared to say that any and all dialectics are to be rejected.

Mr. Fawcett seems to think that all panlogism must be Hegelianism, and that with the overthrow of Hegelianism panlogism of any kind and conception is doomed.[1] Panlogism is an old theory. It has practically been the consciously or unconsciously avowed tenet of all religion and philosophy. It is the soul of Platonism; it lurks in the fantastic theosophy of Neo-Platonism; it is beauti-

[1] The same idea prevails among the Hegelians who imagine that Hegelianism alone is a consistent philosophy of rational thinking. Of this the article by E. Digby in this number is good evidence. While Hegelianism has almost entirely disappeared in Germany, it seems still on the increase in England and America.

fully expressed in the Logos theory of the Fourth Gospel; it is not absent in St. Augustine and St. Thomas; among the schoolmen it is the philosophical background of realism, and finally it is the corner-stone of the spirit of modern science; it is the underlying keynote of monism, for arguments of any kind presuppose its truth. Without panlogism the universe would be a chaos of innumerable particulars, be they monads, or atoms, or what not. But if panlogism be true, the universe is necessarily and intrinsically a unity.

The unity of the universe is neither local, nor temporal, nor material; it is not comparable either to the center of a circle, or to the capital of a country. The unity of the universe is a unitariness of its constitution, and not the dominion of a central monad over other monads of less importance. It is not a definite unit, but a sameness of the laws of existence, a oneness of the cosmic order. God is not one in number, but one in kind. He is unique. To believe in one God, as opposed to several Gods, is a pagan view which is more advanced than polytheism but remains upon the same level.

THE UNITY OF CONSCIOUSNESS.

The fact upon which Mr. Fawcett builds his monadology is the unity of consciousness. The monadologists know very well that the mind consists of many images and exhibits a very complicated thought-mechanism, but they regard all thoughts as mere tools in the possession of the soul-monad. The fact that there is always one idea uppermost in a normal consciousness is explained by the assumption that the soul-monad selects one thought or another as an object of its attention. But the unity of consciousness is no more a reason for believing that man's soul consists of a monad, than the unity of a watch would be for supposing that there is in every watch an indivisible watch-monad which causes its hands to denote by their position one definite moment of time. The fact that one idea is the strongest and monopolises consciousness is no more wonderful than that a man can at a time walk in one direction only, and not in two, three, or four, or that his eyes can focus one object only and not two, or three, or more. If every unitary action de-

manded the presence of a monad, we would be in need of electricity-monads for electric currents, engine-monads for every machine, and national monads for every nation that has a distinct individuality and history of its own. The unity of consciousness does not imply that there is a definite and impervious centre in the conscious being but is conditioned by the object of attention, which may be a thing outside that is watched, or an idea, a purely mental representation that is considered.

But Mr. Fawcett will say that every man is in possession of an ego-consciousness which attests his identity throughout all the changes of his life. Yet what is that ego-consciousness but the habit of calling oneself by the same name, John Brown or Tom Smith, or whatever it be—a name which can be replaced by the pronoun "I." The word "I" denotes a man's personality, and his personality represents certain soul-forms in continuous development. A certain stock of thoughts and impulses remains permanent while others change and still others are added. Whatever view we take of a soul-monad, whether it be conceived as the ever-shifting attention that determines the unity of consciousness, or as the notion of one's own self, subsumed under the collective word-structure "I," or the continuity of our life-history, it can never be conceived as a centre. There are various ways of conceiving the unity of man's mental organisation, but this unity is not one of place or substance, and a monad-conception is perfectly redundant.

THE IDENTITY OF PERSONALITY A PRESERVATION OF FORM.

The immortality of the soul depends according to Mr. Fawcett upon the preservation of the monad of a man,—a very precarious immortality, indeed, for this monad is a very hypothetical creature. But so enthusiastic is he about the preference of his monadology that he fails to understand the monistic conception of immortality. He says, "If body and soul are inseparable, the soul must die with the body." Thus, he concludes, the monistic conception of immortality is "a mockery in all seriousness."

Now it is true that monism insists in a certain sense upon the inseparableness of body and soul; we cannot cut the soul out of

the body and say, here is my soul and there is my body. There are not souls in themselves. Wherever a soul exists, it is incarnated in a body. Mr. Fawcett might, in his imagination, pride himself on being able to remove the monad from the bodily system. It would be interesting to witness the experiment and to see what a monad looks like, how it is benefited by the mental acquisitions registered in the brain, and whither it migrates after its separation from the body; but other mortals like myself, who are less imaginative, will, so long as nothing is known about monads, find no comfort in his hypothesis.

But if there is no soul-monad, must we not accept the dreary theory that the soul dies with the body?

Mr. Fawcett forgets that while the soul is always inseparably connected with materiality, it is not identical with the body. We repeat: soul is the form of feelings, and the form of feelings depends upon the form of the nerve-activity of an organised system; and every organised system consists of definitely arranged groups of material combinations. The soul is preserved wherever the form is preserved; but the preservation of soul-forms does not depend upon the retention of those material particles which at a given moment constitute the body. The fact is familiar that the material particles of living beings are constantly changing. Life, physiologically considered, is *Stoffwechsel*, a constant flux of materials. There is no sameness of substance whatever. The identity of a living being involving the sentiments of consciousness is not maintained through the presence of a monad, but through the preservation of its form. All the many subconscious and conscious memories which form the elements of our mentality are definite traces of former sense-impressions, reacting upon sense-impressions, and embodying sentiments, and thoughts, the forms of which are preserved in the cerebral system, the substance of which is constantly changing. Am I for that reason another person because I cannot think the same thought twice with the same molecules? Does the thought change because the oxygen engaged in the first act of thinking has now entered new combinations and is soon to be discarded from the system as waste material? We might as well de-

clare that the significance of a word changes when it is written once in pencil and once in ink. Man's personal identity consists not in any way in an identity of material particles, but in the sameness of form which is preserved by the continuity of his existence.

IMMORTALITY.

The continuity of life appears to be broken in death; but we must emphasise that it is not broken, it only appears to be broken. Every action in which a man manifests himself is a preservation of his peculiar personality, it preserves his individual life-forms and immortalises him. The spheres of influence vary greatly, but no man can fail within the range of his circle to impress his soul upon the future evolution of the race. The evolution of life on earth is as continuous as the life of every individual being; and every individual being is such as he is only because the soul-treasures of former life are hoarded up in him; he is not a beginning from nothing but represents the continuation of the soul-forms of which he consists at the start of his life. He is the product of evolution. He adds something of his own, be it little or much as the case may be, and impresses his soul into the new life that grows up around him.

These considerations are not fancies, but descriptions of the facts of life. This immortality is a truth and, indeed, an indubitable truth, which no one can deny. The same continuity of soul that takes place in every individual life, can be traced in the development of the whole of mankind. Mr. Fawcett has not offered a refutation. All he can say against it is that he is not pleased with it. He says:

> "For myself I would not give two pence for an immortality of this kind, and I have no doubt that the average man in the street will heartily echo my sentiments."

We may fairly grant that the average man in the street does not care for preserving his soul in the further evolution of mankind, but Mr. Fawcett will scarcely pride himself on the applause of the vulgar, should his monadology be unfortunate enough to receive it. We might as well revive the Inquisition as an ultimate authority of orthodoxy as enthrone the man of the street upon the tribunal of

truth for deciding what shall be or shall not be acceptable. Whatever the man of the street may think, the fact remains that there is a preservation of soul-forms, and evolution would be a very mysterious process if this kind of soul-immortality through the continuous preservation of soul-forms were not true.

Quoting from me the sentence that "Christ is actually a living presence in humanity," Mr. Fawcett says:

"No, no, not so fast. The Nazarene's body has long ago mouldered into dust, assuming that he ever lived. His soul therefore, on the lines of monistic positivism has been extinguished. What is 'present in humanity' is not Christ, but ideas *about* Christ, which is a very different matter."

Now we concede that ideas *about* Christ are not Christ himself; but the ideas *of* Christ are Christ. The soul of Jesus did not depend upon that heap of atoms which constituted his body; the soul of a man consists in the thought-forms and word-forms which dominate his entire being and determine his conduct. The soul of Jesus consists in his teachings, and his teachings are preserved in words which have now been translated into all languages of the world. The words of Jesus are his soul, and his soul is immortal, and this is good Christian teaching too; it is not a church-dogma but it is the doctrine of the Christ of the Fourth Gospel.

We read in John vi., 63, and to indicate the importance of the quotation I quote it in pica:

"It is the spirit that quickeneth; the flesh profiteth "nothing. The words that I speak unto you, they are "spirit and they are life."

This is no figure of speech, but literal truth. Spirit is not a substance; spirit is the significance of words; and what is more significant than words that are true. Words are spirit, and it is the spirit that quickeneth. Christ lives where the word of Christ is received and where it becomes the motive of conduct. The materiality of man's life, the human body, is in its way important enough, but it is important only as the vessel of spirit. The body is not the man; the atoms are not his soul; the corporeal is not the highest and the immortal part of our being; and, in spite of the temporary in-

separableness of soul and body, there is no truth in the identification of soul and body.

The soul of a man is inseparable from his body; and yet the soul is a distinct and disparate reality which can be preserved while the body is dissolved. In the same way matter and energy are inseparable. There can be no energy without matter and no matter without energy. Yet energy is a distinct and disparate reality. It can be transferred from the burning coal to the water in the boiler, and from the water in the boiler through the steam to the wheels of the engine.[1]

THE IMMORTALITY OF BOOKS.

Take an illustration. Here is the Bible. It consists, as all books, of many sheets of paper covered with little characters in black. Is the Bible destroyed if this copy of the Bible be burned? No, not at all. That which constitutes the Bible is not the material; it consists of those subtle forms which convey the spirit of the Bible. The spirit of the Bible, as it is embodied in the forms of printed words, is impressed upon the paper in printer's ink, but this spirit of the Bible does not consist of paper and printer's ink. Thoughts cannot be burned, and soul cannot be crushed by destroying the forms in which it resides. The inquisitors proposed to extirpate heresy and burned many thousands of heretics, yet they could not quench the spirit, and the heretics have now become the leading nations of the earth.

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[1] I limit myself in my reply to Mr. Fawcett to refuting those points regarding which a difference of opinion obtains. It would lead me too far to explain the various misconceptions of which I find him sometimes guilty. Suffice it to mention that by monism I understand a unitary world-conception, but not a system of thought which explains all facts as phases of *one principle*. (See Mr. Fawcett's article, p. 77, lines 12 and 13.) Matter and mind, body and soul, that which is perceptible by the senses, and spirit, are quite disparate realities. They cannot be conceived as mere phases of one and the same underlying principle. They are radically different abstracts, but they are abstracts made from one and the same reality. The view which subsumes the various qualities of existence under one head, regarding material phenomena as phases of mind, or mental phenomena as phases of matter, is a pseudo-monism which I propose to call henism. I insist that the unity of the whole of existence and the consistency of all truth do not involve the ultimate identity of the various qualities of existence.

THE SIMILE OF THE SEAL.

Another instance of the preservation of form is the imprint of a seal. And indeed the simile is good because it shows, in a better way than the printing of a book, the immateriality of form. The paper receives the form of the letters which constitute the book in printer's ink. There is a transfer of matter and thus the allegory is apt to be misunderstood; but the imprint of a seal is no material transfer whatever. In making a seal-imprint we distribute a certain amount of sealing-wax on paper and stamp the seal on it. The amount of sealing-wax is the same before and after; but before the stamping there is no seal; the seal originates through the impression.

The seal may break or be destroyed, but it can be reproduced, and, whenever the selfsame form is again imprinted into wax, there the seal will reappear. True, there is no seal without sealing-wax or whatever other material be used, but the seal is not the material; the seal is the form which is impressed upon the material.

MIND AND MORALITY.

Taking the facts of experience as the ultimate test of truth, and accepting scientifically elucidated statements of fact as the guide of conduct, we arrive at the conclusion that spirit is paramount in importance, and body is of no account whatever save in the service of the spirit. The value of anything material and also the value of our bodily make-up must be measured by its usefulness in the support and growth of the soul. In itself the flesh profiteth nothing. Inorganic nature is indifferent; the storm, the sunlight, the ocean, are neither moral nor immoral; they are neither good nor bad; they become good or bad simply through mind. If in the starry heavens two celestial bodies should meet in collision, their conflagration would be of significance only if somewhere living souls were affected; otherwise it is more indifferent than a child's sneeze.

I do not say that good and evil are mere illusions. Good and evil are actual facts; but in saying that good and bad, right and

wrong, moral and immoral, virtue and vice, are features of the mind, it is the use of mind that produces these contrasts by its attitude when confronted with the duties that life imposes.

Mr. Fawcett has a very low opinion of mind. He says:

"If right and wrong, good and bad, only exist in our mentality, it appears that the meliorist is sacrificing himself merely for a figment of his own imagination, a barren, thankless ideal of his own making."

This is both a misconception of what I said and an undervaluation of man's mental activity. I say Facts in the objective word are neither right nor wrong; facts are real; they are neither true nor false. If a geometer measures the height of a mountain, his calculation may be right or wrong; but the height of the mountain is not wrong when it turns out to be different from what we expected. In a word: Facts are real, but ideas representing facts are either right or wrong. Error and truth belong to the realm of mentality. Unmental things are neither vicious nor virtuous; virtue and vice rise into being together with mind, for they are attitudes of mental aspiration.

THE PURPOSE OF LIFE.

He who cannot comprehend the essentiality of form will never free himself from materialism in philosophy, psychology, and ethics. He will not appreciate that the most important realities are immaterial. He will try to think God and soul as substances or entities and seek the purpose of life in pleasure.

Mr. Fawcett's monads are entities. They are, closely considered, substances which, for the sake of ridding them of gross materiality, have been reduced to atomic size; and, as to the ethical aspect of life, Mr. Fawcett finds no value in soul-growth, in the acquisition of truth; in the comprehension of life and of its meaning, in the self-realisation of the soul apart from pleasures that may or may not accompany our mental evolution. There is no value in these or other accomplishments except they produce happiness. I said somewhere that evolution consists in the expanse of the soul and in a growth of mind, but that there is no perceptible increase of happiness. The ratio between our wants and their satisfaction re-

mains about the same, and, while it is true that many pains are alleviated, there is at the same time an increase of sensibility to pain. Thus there is rather a decrease of happiness in evolution, for children enjoy life better than adult people, and, in comparison with the lower races, who in their ignorance and simplicity are as happy as children, the most civilised people appear morose and gloomy. A wise man is not happier than a fool; on the contrary, the fool is mostly merrier than a wise man, who foregoes many joys because of his deeper wisdom. Of course there are intellectual and moral pleasures, which, if not greater, are nobler, than the greatest merriment of fools. But it is not (as Mr. Fawcett thinks) the pleasure which gives value to moral aspirations. He says:

"Meliorism does not find the value of life in reaping pleasures. Nevertheless, a value that does not relieve pain or produce, or tend to produce, pleasure, is a thing which I, for one, confess myself at a loss to understand. The term, in fact, seems meaningless. I fail entirely to see why we should vex ourselves here with ceaseless strivings and strugglings, when the cosy nooks of degeneration lie open to us."

Certainly we need not strive and struggle. We have our choice. We can prefer the cosy nooks of degeneration, and if we prefer them we shall have them. There are countries which are governed upon the principle that progress is an evil, and there life is, in many respects, much pleasanter and quieter. Life in England, and especially in North America, makes great demands upon the people, and urges them to exert themselves to the utmost of their abilities. He who measures the values of life by the amount of pain relieved and the greatness of pleasures realised will pity them and regard their lives as failures. How different (and I, for one, say how much truer) is the standard of value given by the psalmist when he says:

"The days of our years are threescore years and ten;
"and if, by reason of strength, they be fourscore years,
"*yet is their strength labor and sorrow.*" (xc., 10.)

I have surrendered the Apostolic creed in its literal acceptance, but I have never ceased to appreciate this sentence of the psalmist on account of its deep truth. In my mental evolution I have been alienated from the Christianity of my childhood; I have abandoned

the dogmatism of church-doctrines; and I have surrendered the paganism of believing in the letter that killeth. I have dared to seek the direct revelation of God in the facts of life and, in taking the consequences of my radicalism, I became more and more convinced that God spoke to the prophets and to Christ in no different language from what he speaks to us; to you, to me, or to any one who is willing to listen. However much the spirit of Bible teachings is misunderstood; nay, whatever errors the authors of the Bible may have been subject to, this much seems sure that they hit upon several very important moral truths which are by no means antiquated. From the standpoint of positive monism, I find them verified, and considering the errors of hedonistic ethics which cannot but lead people astray on the most important questions of life, I find that there is more truth in the two Bible passages quoted in this article than can be found in all the average irreligious literature of to-day. The doctrines of the old religions are in many respects misleading, but in so far as they teach right ethics, I do not hesitate to say that they reveal the truth. He who imagines that the purpose of life is enjoyment will, when he tries to realise the hedonistic principle, be unfailingly and sorely disappointed.

The evolution of mind is not important for itself alone; it is important also and mainly as a revelation of the eternal in existence. Mind is an appearance of truth; it is an incarnation of God. The purpose of mind, accordingly, is its own self-realisation, it is a higher and higher development of truth. The purpose of life is mental growth and mental evolution. Mind hungers for truth; and truth is not only intellectual comprehension but also religious devotion; it is not mere theory but a motive for action. Thoughts are not pure conceits, but motor impulses of a definite character, and, therefore, it is not simply a notion but a power. The more man acquires of truth, the more is he ensouled by God.

Priests have built temples and cathedrals, they have carved dols and images of God, they have worshipped all kinds of symbols and regarded them as holy—but there is nothing holy except truth, and the highest aim a man can have is leading a life of truth.

EDITOR.

SUBCONSCIOUS PANGEOMETRY.

FROM the press of Teubner in Leipsic has just appeared a work which perhaps can best be described as a book on "The Non-Euclidean Geometry Inevitable." This book, *The Theory of Parallels*,[1] by Paul Staeckel, in conjunction with Friedrich Engel, is a marvel of German accuracy, depth, and withal enterprise.[2]

It confers an inestimable boon on thinkers by giving them the actual documents which are the slow, groping awakening of the world-mind at the gradual dawning of what has now become the full day of self-conscious non-Euclidean geometry.

To one who appreciates the judicial weight of German scholarship, it must be highly gratifying to recognise its sanction of the position first put forth in *The Monist*, beginning, *loc. cit.* p. 486: "Euclid did not try to hide the non-Euclidean geometry. That was done by the superstitious night of the fanatic dark ages, from which night we have finally emerged, to find again what Euclid knew," etc.

Says Staeckel, p. 3: "Es ist kein Zufall, dass die ersten achtundzwanzig Sätze von der fünften Forderung, dem sogenannten Parallelenaxiom, durchaus unabhängig sind, und dass dieses erst beim Beweise des neunundzwanzigsten Satzes eintritt; es ist kein Zufall, dass der Aussenwinkel des Dreiecks an zwei Stellen behandelt wird: zuerst, in Satz 16, wird nur gezeigt, dass er grösser

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[1] See *The Monist*, July, 1894, pp. 483–493.

[2] The full title of the book runs: *Die Theorie der Parallellinien von Euklid bis auf Gauss, Eine Urkundensammlung zur Vorgeschichte der nichteuklidischen Geometrie.* In Gemeinschaft mit Friedrich Engel herausgegeben von Paul Stäckel. Mit 145 Figuren im Text und der Nachbildung eines Briefes von Gauss. Leipsic: B. G. Teubner. 1895. Pages, 325. Price, 9 Mks.

ist als jeder der beiden ihm gegenüberliegenden inneren Winkel, und erst später, in Satz 32, stellt sich heraus, dass der Aussenwinkel der Summe jener beiden inneren Winkel genau gleich ist.

"Diese Anordnung berechtigt zu dem Schlusse, dass Euklid die in der Parallelentheorie verborgene Schwierigkeit sehr wohl durchschaut hat."

The very pretty point made[1] against all the modern English translations and editions in reference to the different and more elegant form given by Euclid in Proposition 29 to his celebrated Parallel-postulate is confirmed by Staeckel's re-translation of the original Greek, "wie er in Heiberg's neuer ausgezeichneter Ausgabe vorliegt."

Saccheri discussed the contribution made by Wallis to the theory of parallels, and Staeckel, after his re-translation of Euclid's Book I., through Prop. 32, gives this passage from Wallis, and then proceeds to Saccheri himself.

In *The Monist*, p. 489, a sentence was quoted from Dr. Emory McClintock[2] in regard to Saccheri, with grave doubts. It reads: "He confessed to a distracting heretical tendency on his part in favor of the *hypothesis anguli acuti*, a tendency against which, however, he kept up a perpetual struggle (*diuturnum proelium*)."

Translating Saccheri's book into English strengthened these doubts into the conviction that the whole was an error based on a mistranslation of the passage pointed out by the two Latin words retained in parenthesis. A letter embodying this conviction was written to Dr. McClintock, who thereupon made a special trip to the Astor Library to read again Beltrami's article on Saccheri, entitled: *Un precursore italiano di Legendre et di Lobatschewsky.* He thereupon answered:

"I have just read Beltrami in the Astor Library, also my own paper. Saccheri was always fighting against the heretical results of his own logic on behalf of what he obviously considered God's truth.

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[1] *The Monist*. p. 488.

[2] *Bulletin of the New York Mathematical Society*, Vol. II., p. 145.

"I did not speak of him as yielding; but one who is battling manfully against the productions of his mind may fairly be described, I think, in the words you dispute, though Saccheri's 'confession' is implicit and not explicit.

"I should have done better to use the words 'suffered from' for 'confessed to,' though there is sufficient confession in the 'proelium.'

"Beltrami is disgusted by the unexpected triumph of faith over logic.

" 'Or qui crederebbe che subito dopo la proposizione testé citata il lettore dovesse vedersi comparire innonzi quest' altra. [Prop. 33.] Eppure è proprio cosi. L'Autore fa un lunghissimo discorso per conestare piuttosto che dimostrare cotesto suo asserto. . . . *Si direbbe quasi che l'Autore, più che a convincere altrui, si adoperi a persuadere sè stesso. . . .*'"

But still the conviction remained that there was no adequate ground in Saccheri for this interpretation of the "diuturnum proelium" passage.

A transcript of a considerable portion of the only copy of Saccheri's book then on this continent was made and sent to Dr. McClintock. He at once replied:

"I thank you for the manuscript, which I shall take care of and return. Now I need to consult Beltrami's article again.

"The original context of the 'diuturnum proelium' gives me a wholly novel view of it, instantly. It was a reference to a 'running fight' on paper, part of a mere summary of the book.

"I had supposed it to be a bit of mental autobiography.

"I do not doubt that Beltrami's mention of it is not inconsistent with the meaning Saccheri intended,—yet it failed, even the other day after your question, to suggest to me the true meaning. I will write again after I can get to the Library.

"You can blame me and the lack of context, not Beltrami, unless his suggestion that *Saccheri was trying to persuade himself*, may have helped."

The article in *The Monist* continues as follows: "The Inquisitor-general and the Archbishop of Milan saw Saccheri's book on

July 13, 1733; the Provincial of the Company of Jesus on August 16, 1733. Within less than two months Saccheri was dead and buried. Not so his book. It was reviewed in the *Acta Eruditorum* in 1736. It was probably in the library at Göttingen about 1790–1800, for it is marked with an asterisk in the *Bibliotheca Mathematica* of Murhard. In this work it is signalised (I. II., p. 43) among the writings consecrated to the explication, to the criticism, or to the defence of Euclid (*Einleitungs- und Erläuterungsschriften, auch Angriffe und Vertheidigungen des Euklides*). It therefore attained a certain notoriety. Did it escape the notice of Gauss?"

This suggestion has now been verified by Engel and Staeckel (p. 38) with truly German minuteness. "Der *Euclides ab omni naevo vindicatus* scheint ein ziemlich verbreitetes Buch gewesen zu sein. In Deutschland haben wir sein Vorhandensein auf den Königlichen Bibliotheken zu Berlin und Dresden und auf den Universitätsbibliotheken *in Göttingen* (*seit 1770*), Halle, Rostock und Tübingen festgestellt."

In the very brief sketch of Lambert by F. W. Cornish of Eton College, inserted in the *Encyclopædia Britannica* in 1882, how did it happen that from the mass of Lambert's papers one of the few mentioned should be that on *parallel lines*? If any hint of its known or possible interest was meant, it bore fruit; for only in 1893 and by accident did Staeckel discover in Lambert a precursor of Bolyai and Lobachewski. In the present book seventy-two pages are devoted to this treatise of Lambert. It is a developed consistent non-Euclidean geometry.

In some points it falls short of Saccheri; for instance, in not reaching Lobachewski's highly interesting "boundary-lines."

But in other respects it goes beyond Saccheri. Its examination, as compared to the writings on which the claims for Gauss are made, shows some startling coincidences.

That it was familiar to Gauss is clear from the letter of Bessel to Gauss, Feb. 10, 1829, where it is referred to as something well-known in the following paragraph:

"Durch das, was Lambert gesagt hat und was Schweikardt mündlich äusserte, ist mir klar geworden, dass unsere Geometrie

unvollständig ist und eine Korrektion erhalten sollte, welche hypothetisch ist, und wenn die Summe der Winkel des ebenen Dreiecks $= 180°$ ist, verschwindet.

"Das wäre die wahre Geometrie, die Euklidische aber die praktische, wenigstens für die Figuren auf der Erde."

Says Lambert, § 79: "Ich habe aber vornehmlich bey der dritten Hypothese [angle-sum $< 180°$] solche Folgsätze aufgesucht, um zu sehen, ob sich nicht Widersprüche äussern würden. Aus Allem sah ich, dass sich diese Hypothese gar nicht leicht umstossen lässt.

"Die erheblichste von solchen Folgen ist, dass, *wenn die dritte Hypothese statt hätte*, wir *absolutes Maass der Länge* haben würden."

Says Gauss in his letter to Taurinus, 1824: "Die Annahme, dass die Summe der 3 Winkel kleiner sei als 180°, führt auf eine eigne von der unsrigen (Euklidischen) ganz verschiedene Geometrie. . . . Alle meine Bemühungen, einen Widerspruch, eine Inconsequenz in dieser Nicht-Euklidischen Geometrie zu finden, sind fruchtlos gewesen, und das Einzige was unserm Verstande darin widersteht, ist, dass es, wäre sie wahr, im Raum eine an sich bestimmte (obwohl uns unbekannte) Lineargrösse geben müsste."

Says Lambert, p. 200: "Diese Folge hat etwas Reizendes, welches leicht den Wunsch abdringt, die dritte Hypothese möchte doch wahr seyn!"

Says Gauss, p. 250: "Ich habe daher wohl zuweilen im Scherz den Wunsch geäussert, dass die Euklidische Geometrie nicht die Wahre wäre, weil wir dann ein absolutes Maass *a priori* haben würden."

Again Lambert shows that the formulas of this non-Euclidean geometry are simply those of spherics on an imaginary sphere. Now what Dr. McClintock (*Bulletin*, Vol. II., p. 146), calls "the important formula for the circumference of a circle published later by the younger Bolyai," given in 1831 by Gauss in a letter to Schumacher, is nothing but the elementary expression for the circumference of a circle on a sphere where the radius r has been replaced by $r\sqrt{-1}$. Moreover it is now known that Bolyai János discovered his system of Pangeometry in 1823.

In a letter of May 17, 1831, Gauss says: "Von meinen eignen Meditationen, . . . wovon ich aber nie etwas aufgeschrieben habe, . . . habe ich vor einigen Wochen doch einiges aufzuschreiben angefangen. Ich wünschte doch, dass es nicht mit mir unterginge."

It is mentioned in *The Monist* that in a letter to Schumacher, Gauss tells him that "a certain Schweikardt has given to this geometry the name of *Astralgeometrie*," and Gauss added in regard to him the brief note: "Früher in Marburg, jetzt Professor der Jurisprudenz in Königsberg." On p. 9, of the English translation of Vasiliev's Address on Lobachewski is the sentence: Taurinus in his *Theorie der Parallellinien* (1825) says: "The idea of a geometry in which the sum of the angles of a triangle is less than two right angles was already communicated to me four years ago (by my uncle, Prof. S., in K., then still in M.)."

Ferdinand Karl Schweikart (1780–1857) studied from 1796 to 1798 in Marburg, attending there the mathematical lectures of J. K. F. Hauff, who since 1793 had published different writings on the question of parallels. From 1812 he was professor in Charkov; from 1816 in Marburg; from 1820 in Königsberg. Entirely by himself, without the slightest suggestion from any man, he developed and taught a non-Euclidean geometry.

Engel and Staeckel seem to delight in the perfect proof of his independence from even the remotest connexion with Gauss.

Gerling (1788–1864) from 1817 professor of astronomy at Marburg, wrote to Bolyai Farkas: "We had here about this time [1819] a law professor, Schweikart, who had previously been in Charkov, and had attained similar ideas, since, without aid of the Euclidean axiom he developed in its elements a geometry, which he called *astralgeometry*. What he communicated to me in regard to it, I sent Gauss, who then communicated how much farther had already been advanced on this way [wie viel weiter man schon auf diesem Wege gekommen]." Can this refer to Saccheri or Lambert? Our authors say, p. 252: "Schweikart's achievement consists in this, that independently he clearly recognised and declared the possibility and the justification of a non-Euclidean geometry."

It is satisfactory to give every one the place justly due in what

will perhaps be eventually looked upon as the profoundest achievement of modern thought, but it is really comforting to have reaffirmed as the mature outcome of this splendid work what has already long been the world's judgment, that Bolyai and Lobachewski must be looked upon as the real founders of the non-Euclidean geometry.

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The new book of M. Fr. Paulhan, *Les types intellectuels, Esprits logiques et esprits faux*, is a continuation and amplification of its predecessor, *Les caractéres*. M. Paulhan attempts a searching examination of the human mind, with a view to indicating such of its qualities as can be arranged in a definitely graduated scale, the model of which is a perfected psychological scheme defined *a priori*. The author discovers the required psychological model in systematic association or in "finality," and I shall not attack his doctrine upon this point, but shall restrict my remarks to his mode of arranging intellectual types.

The author is guided by a distinction, antecedently made, between the *form* of mind, or its modes of operation, and its *matter*, or the thoughts and images characteristic of men as members of classes. Is this distinction a legitimate one? It doubtless is so, for the rational or irrational character of the mind (I should have preferred the antithesis *Esprits justes et esprits faux*) may manifest itself alike in two totally different persons, say a musician and a jurist, who do not work upon the same materials, and who make use of different thoughts and images. There are reasoning and unreasoning types of poetical imagination, as I myself pointed out not long ago. Nevertheless, I believe there are difficulties in the path on which M. Paulhan has ventured.

No one will think of disputing his right to establish, first, a primary series of intellectual characteristics, resting, as he would formulate it, (1) upon the degree of independence asserted by the

intellect over the emotions and (2) upon the form of the mind's associations, and then subsequently to set up a secondary series founded upon the thoughts and images with which the mind operates. But have we not here two principles of classification absolutely independent rather than a set of characters naturally subordinated to one another? Do not categories of *form* and categories of *matter* apply to two facts alike general and alike important according to the view which we take of them? The method pursued by M. Paulhan consists, therefore, in discovering in single individuals, viewed apart, such and such marks, all of which have been previously defined by abstract analysis. It offers thus a means of giving excellent descriptions and highly finished portraits. But if we attempt to assort individuals by the rigid categories here marked out we shall run the risk of dissipating the total personality of the individual, and of losing it altogether. The method culminates rather in a reasoned set of interrogatories than in a real classification.

"Between abstract laws and individuals," writes M. Paulhan, "there are no mental groups—no intellectual species—*having interest for general psychology.*" By this declaration he seems to have definitely circumscribed his plan and to deny all psychological value to the natural history of societies founded upon such spontaneously engendered groups as race, classes, and professions. Yet is it not undeniable that the choice of a profession presupposes *some* profound resemblances between individuals who may in other respects be unlike? This is an open question. But the creation of professional types encounters difficulties and is susceptible of criticism, the justness of which I can all the more appreciate from having once personally attempted the task. I am by no means pleading *pro domo med*, but am concerned only with discovering the truth. In fine, then, I understand perfectly well how M. Paulhan can produce good portraits by his method, but am at a loss to perceive how his individuals are to be classified in relation to one another; and I particularly doubt if the groups obtained by his methods will ever exhibit anything approaching to lifelike objectivity or reality.

In the meantime it will be well to await the appearance of the second volume, which M. Paulhan has announced, when we can judge of the entire work with perfect knowledge. A high value it will always possess, both by its wealth of details and by the place which it occupies in the philosophical thought of the master. I should offer some apology for having devoted so few lines to the commendation of the book if that were not superfluous in the case of a writer of the author's standing.

* * *

M. L. MARILLIER offers us a French translation of the learned work of ANDREW LANG, *Mythes, cultes et religions.* As there is no necessity of speaking of the work itself here, I shall apply myself to the remarkable introduction which the translator has prefixed to it. M. Marillier first refers to the new direction which the study of religion has taken, in consequence of which the anthropological and psychological school has dethroned the philological school followed by Max Müller. The comparative study of religions will enable us, he says, to disclose this truth that there exists a religion common to all humanity, or at least a mythology based upon ideas and modes of knowing and feeling, which are the same for all human beings, no matter what their race or nationality may be. In the presence of the phenomena of nature men have everywhere put the same questions and given approximately the same answers. The myths are innumerable, but may be reduced to a small number of types. Mythologies, in fine, lie at the foundations of all religious edifices; they represent a common aggregate of ideas and of sentiments, and at the beginning took the place of theology, science, and ethics.

Are myths things of the past? Must we accept with Comte that the different forms of thought in succeeding each other replace each other? M. Marillier is not of this opinion. He does not believe that science will eliminate metaphysics. All depends upon the significance in which the word is used, for the answer will be different according as we consider the lower or the higher forms of speculation. Sound knowledge will never exclude broad and comprehensive inductions; but it is incompatible, in one and the same

mind, with arbitrary and infantile fancies which have not the character of positive hypotheses. Comte made an unfortunate application of the vague word metaphysics, and one which has considerably injured his doctrine. It is advisable to extend his conception instead of narrowing it, and then the incontestable truth which it expresses will appear in its full light.

M. Marillier also apparently reproaches Comte with having failed to recognise the existence of a *special* religious emotion. But what can such a religious emotion mean, separated from all "dogmatic affirmation" and from all "moral precepts"? Is it sufficient to assure the existence of religion,—that "assemblage of emotional states, of sentiments and desires," to which M. Marillier attributes distinct originality, although comparing it to æsthetical emotions? The religious emotion, in my eyes, is intimately connected with the mental state of the individual and the race, and it is dependent at all times upon the beliefs actually living in the minds of men. It is the echo, in the emotional life, of our conception of the world, whether the same be derived from tradition or from science, whether it be formed of faith or of scientific hypothesis. And this religious emotion actually offers widely diverging characteristics, even in men like Francis de Assisi and a Vincent de Paul, in Herbert Spencer and Guyau, not to speak of the savage who has his head full of superstitions and terrors. It does not wear with all of us the same dress; it is continually modifying, according to the state of our general beliefs; it is a reflected product of the psychological state, or if you wish, a particular aspect of our fundamental emotions, but not a spontaneous and primordial fact. Every attempt at constructing a religion ought therefore to aim at producing a new knowledge, a new view of the world, which would thereupon engender a corresponding emotion. Thus it is I conceive the continuity and evolution of religious life, upon a basis common to the whole human species. Otherwise, if religion were not the work of man himself and a product of his culture, we should be forced to revert to supernatural revelations and to the mysteries of an inexplicable psychology.

M. SULLY PRUDHOMME, in his *Que sais-je? Examen de conscience*,[1] has taken up the fundamental problems of philosophy. He "rethinks" them after his own fashion, but does not succeed in elucidating them. Neither the notions of existence and of substance, nor the doctrines of free will and determinism receive new light from his complicated analyses. The fact is that, worn out at last by the effort he has put forth, the poet takes refuge in "sentiment"; and by sentiment he understands a genuine inward revelation, the connecting bond of which with any sort of metaphysical existence escapes us. He has borrowed from his excursion into the domain of modern science a prudence that discomposes him and runs counter to his true philosophical nature, which tends to ancient idealism. He is precise neither as to the meaning of soul nor as to that of ideals. His vision is stationary and without support, and his criticisms are nowhere striking. But it is surprising that he has retained the phantom of the *unknowable* after having properly enough declared that he regards it merely as a synonym of what will always remain unknown to man in the phenomena of the universe,

Dialectic subtlety, inability to throw a vivid light on the great problems, recourse to sentiment and to the mysterious endowment of the poet and the artist,—such are the characteristics of the work of M. Sully Prudhomme. But his effort is of altogether too noble a character and of too great rareness among the poets of our day not to command our appreciation and sympathy. The faults of his work have not prevented its having many lofty and eloquent pages. M. Sully Prudhomme has a soul of delicate fibre and a mind of frankness, and these are qualities which render him in our eyes a man of superior worth.

* * *

M. JULES PAYOT has taken up similar problems in his book *De la croyance*. I shall not discuss the psychological theory upon which he has based his work, and which regards belief as a genus of which certitude is merely a species, belief itself being declared identical

[1] P. Lemerre, publisher. The other works mentioned are published by F. Alcan.

with will. The state of relativism and subjectivism to which we are subject leads M. Payot to declare that reality is without our reach, and conducts him to an "irremediable intellectual scepticism." He opines, however, that it will not do to allow scepticism to enter the domain of ethics, and that it is imperative to create in the consciousness of nations a system of moral beliefs of absolute universality. We can become, he says, masters of our own beliefs and almost entirely so of the beliefs of others, particularly those of children, which he seeks to show in the part of his work devoted to the "mechanism" of belief, after having studied its object and nature.

The project is an excellent one, although its realisation may be effected by different methods. Nevertheless, M. Payot appears to me to be laboring under an illusion when he speaks of "educating universal suffrage." This last institution possibly has not the solidity which he attributes to it, and many reasons make for the presumption that the progress of social organisation will modify it profoundly. Another point also affords me difficulty. M. Payot demands a faith "living and always ready for action and self-sacrifice," which he opposes to the "theoretical and abstract" faith. But is this opposition really so radical? And how are we to interpret it when he adds himself with eloquence and aptness that the triumphant idealism of to-day teaches us to *comprehend* "that what constitutes our worth is the fact of our being the transitory expression of the essence of things, and that our whole destiny and more so our duty is to labor to become the most perfect expression possible of the laws of this essence?"

* * *

I regret not being able to discuss the solid thesis of M. E. THOUVEREZ, *Le réalisme métaphysique*, from which I shall merely cite the author's belief "in the unity of all the principles, in the harmony of the world and of the mind, in the regular constancy of all rational laws, and in their existence in God who guarantees and directs them," and also his affirmation that the "reality of this God is the great miracle in the world which the world cannot comprehend."

I also regret being only able to mention the following works:

Histoire de la philosophie atomistique, by L. MABILLEAU, which is quite important; *La Théorie platonicienne des sciences*, by ELIE HALÉVY; *L'Ecole Saint-Simonienne*, by GEORGES WEILL, a very instructive book; and among the less voluminous productions a thesis of M. J. LACHELIER, which was widely noticed on its original appearance, entitled *Du fondement de l'induction*, and which is supplemented in its present new edition by the article *Psychologie et métaphysique*, to which perhaps we may refer later; an *Exposé critique des principes du positivisme contemporain*, by M. JEAN HALLEUX, in which the author seems to be bent especially on demonstrating that human knowledge, while having its root in sensuous experience, yet ultimately goes far beyond the data of experience; a French translation of the *Paradoxes* of Nordau; the new study of applied psychology to which M. F. QUEYRAT gives the title *Les caractères de l'éducation nouvelle*; and finally, the extracts from the ethics of the Chinese philosophers, which M. J. DE LANESSAN has conveyed to us from India and China.

I had almost forgotten, in a different order of studies, the learned and interesting work of M. C. BOUGLÉ, *Les sciences sociales en Allemagne*, arranged with a view of exhibiting to us, after the manner of Lazarus, the plan of a psychology of nations; after Simmel that of a science of morals; after Wagner that of a political economy; and after Ihering that of a philosophy of law.

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DIVERSE TOPICS.

HEGEL'S MONISM AND CHRISTIANITY.

Looking back upon the history of ideas in the past and noting the ever-changing waves of opinion, the different systems of philosophy, the rise and fall of religions, we are moved by a strong desire to find out if there is not a single principle the truth of which has been demonstrated by its capacity of endurance and by the endurance of all that has been its logical outcome. There has been a universal belief that such a principle exists holding good in philosophy, religion, and ethics which would form the foundation for an enduring and world-wide system. Amongst the Greeks this belief first found expression in the teaching of the Ionic philosophers, for them this mysterious fundamental principle was a material one—Water, Air, Fire. The Pythagoreans had Form for this principle; following upon the Pythagoreans came the Eleatics, their principle was Pure Being; the system of the Eleatics was the first attempt at Monism, but an unsuccessful one withal, because it ignored the world of sense instead of absorbing it. From the very earliest time every system of philosophy has been vitiated by a persistently recurring dualism, in all there was an endless antagonism between the material and the spiritual, between the world of sense and the world of ideas. Could the Eleatics have found a ground of union between Pure Being and the sensible world, or Plato between his ideas and the world of sense, a monistic philosophy would have been the result. About the year 400 B. C. we have Xenophanes the Eleatic propounding the proposition that "all is one," and his follower Zeno teaching the doctrine "of the one sole, simple, and immutable being"; but they could not retain the monistic idea, nor build it up into a definite philosophical system; Pure Being and Phenomenal Being were unreconciled, and until a reconciliation was brought about their philosophy could be only a badly concealed dualism. Even the master mind of Socrates could not discover the necessary connexion between the different branches of philosophy, so he was content to devote his whole time to problems of ethics and the social life of man.

The life of the Greek people as a whole owed its temporary joyousness to its complete unconsciousness of the inherent difference between the material and the spiritual. Their gods, their state, and their national life were all so closely bound

together that the people were rendered incapable of looking, as it were, at things as outside of, or as separate from, themselves. When their self-consciousness did develop sufficiently to enable them to distinguish between things spiritual and material, their light-hearted joyousness disappeared, not having had any better foundation than a child's delight in things bright and beautiful. In Neo-Platonism we see the last attempt of the Greek philosophers to establish monism; to the Neo-Platonists the antagonism between spirit and matter was distinctly apparent, and the method by which they sought to unite these two opposites showed a marked advance in their intellectual power; they conceived that the ground of union lay behind this dualism. Plotinus was the most celebrated exponent of this school, and under his guidance dualism was explained away by mystical references to a Pure Being, One and Indivisible, which was at once the beginning and the end of all things. Neo-Platonism was not a perfect monism, because Plotinus and his followers were at war with the body. The expression of the perfect monistic idea with respect to the connexion between body and soul is to be found in a verse from R. Browning's "Rabbi Ben Eyra":

> ". . . . Let us not always say
> Spite of this flesh to-day
> I strove, made head, gained ground upon the whole!
> As the bird wings and sings
> Let us cry, 'All good things
> Are ours, nor soul helps flesh more, now, than flesh helps soul!'"

The hope that by the mortification of the flesh the soul would advance in holiness, has been from all times one of the extremes into which thoughtful men seeking peace have fallen. With the dawn of Christianity Greek philosophy languished and died, though Christianity did not fight with philosophy but with prejudice in the earliest days of its life. This new religion was held to be a special and direct revelation from God, yet in its cardinal doctrine we find the very thought that men had been for so long striving after, namely, the reconciliation between spirit and matter, between man and that God who had always seemed so very far away. It was not as if Christ was a leader of men simply by reason of a superiority in His manhood alone, but because He claimed to be divine, in the same sense that God is divine, and because of this claim, because of the astonishing greatness of this claim, Christianity has been especially open to endless attacks and to severe adverse criticism. If we hold that the intellect of man is his most godlike attribute, we will be very ready to believe that by his unaided intellect he would naturally attain to certain truths, which, when a direct revelation should come from God, would be seen to be the foundations upon which that revelation would be built; this would not come as a strange and foreign idea thrust upon man from without. Christianity came, taking hold of and making real that shadowy idea of a unity in opposites which had been so dimly apprehended by man. True, it introduced a greater amount of mysticism than the generality of men could grasp; but to coun-

terbalance this, there was the manhood of Christ, His very practical life, and His care of all things pertaining to the bodies of men. If this wonderful mode of reconciling the material and the spiritual could only have been appreciated by the followers of Christ,—religion would never have lost its philosophical side, and the unfortunate antagonism between the two would not have occurred: but almost immediately upon the death of Christ we find His disciples condemning the knowledge and wisdom of men. If Christ's religion is to spread and increase amongst all nations, as prophesied by its founder, its position must be strengthened on all sides. It must be the religion of the literary and the learned as well as of the simple and ignorant; it must have its roots in ethics, in philosophy, in art, and in science. The best proof that it underlies all things intellectual, physical, and moral is found in the fact that its truths can be reached by other than the beaten paths of revelation. St. Paul, when preaching to the Athenians, desired that they should understand the close relation existing between men and God; he could find no better way of expressing himself than by quoting to them the words of their own poet Cleanthes, "We, too, His offspring are." Bishop Lightfoot writes: "We might "imagine ourselves listening to a Christian divine when we read in the pages of "Seneca that 'God made the world because He is good,' and that 'as the good "never grudges anything good, He therefore made everything the best possible,'" and sayings very similar to those we find in the writings of Plato. We are even reminded of the words of Christ: "For whosoever shall do the will of my Father "which is in Heaven, he is my brother, and sister, and mother," when we read in Seneca, "Between good men and the gods there exists a friendship,—a friendship do I say? Nay, rather a relationship and a resemblance." Scores of passages could be cited from the writings of Seneca and others of the sages teaching precisely the same ethical doctrine, and having the same mystical meaning as the teachings of the disciples of Christ. Heaven and Hell were not first made known to man by the revealed word, there is the Olympus and Hades of the Ancients, materialistic in conception, it is true, but not more so than the Heaven and Hell of Dante. The immortality of the soul is not an essentially Christian doctrine, it was held by the Egyptians and the Assyrians at a very early date. Of course, it is not contended that all these doctrines and ideas were presented in as pure a form as Christ presented them, but the minds of men had been travelling towards them naturally, and philosophy had long been conscious of the idea which showed itself as the core, the very essence of Christianity. It remained for Hegel, that great monistic philosopher, to unite the Christianity of the spiritualists with that of the philosophers.

It may be said that thought at the present day has been so saturated by Christian spiritualism that it is impossible for Christian truths to be reached by independent means, but this cannot be maintained with regard to such a philosopher as Hegel; it must have been clear to him that only by emptying his mind of all preconceived ideas could pure philosophical truth be attained to. If the preconceived

ideas were true ones, then the mind would be guided back to them by the light of reason. It was not from clinging remnants of revelation that Hegel built up a monistic philosophy and a religion which in its last analysis was Christian truth. Kant, Jacobi, Fichte, and Schelling were Hegel's immediate predecessors in philosophy; their aims were similar to his, but their systems were not so successful: they stumbled and fell into the pitfalls of dualism.

There is one important thought in Fichte's philosophy, however, which is worthy of note here; Schwegler explains it in the following words: "It is reasonable to expect on the part of God, as moral regent of the universe, the communication to men of pure moral principles through the medium of the senses, or the revelation of Himself as lawgiver to them by means of a special and appropriate manifestation in the world of sense. An actual revelation would be here, then, a postulate of practical reason." Both Fichte and Schelling occasionally drew very near to the monistic goal which Hegel so triumphantly reached. Fichte, when he speaks of the necessary union between God and man, and of the important part played by Renunciation in the life of man, and Schelling when he teaches that "unless there be a dark ground, a nature, a negative principle in God, there can be no talk of a consciousness in God." Again, "Naturalism would think God as ground [immanent], theism as cause of the world [transcendent], the truth is the union of both characters, God is at once cause and ground." But they only touched on those thoughts, rose to them, as it were, by intuition; it remained for Hegel to incorporate them into a definite system of philosophy. It was by profound study and much painful thought that Hegel reached the fundamental axiom of his philosophy. He saw clearly that it was on the rock of dualism that all previous philosophical systems had been wrecked: Christianity itself was in some danger from the same cause.

All along the line philosophers had fallen either into materialism or idealism, and earnest thinkers into dogmatism or atheism. Idealism was no cure for materialism, nor blind, unreasoning faith for scepticism. The unity of opposites then was the foundation upon which Hegel determined to build up his philosophy; he set himself "to show that the kingdom of nature and spirit are one in spite of all antagonism," nay more, "that this antagonism itself is the manifestation of their unity."

Touching the success of this theory in the province of metaphysics, we find Hegel's system of logic quite able to make good the position which he took up. The old difficulty between *a priori* and *a posteriori* knowledge disappears before the magic of this logic. There had been an attempt to reconcile the theories of Leibnitz and Locke by a compromise, viz., that we receive facts from without but that the corresponding ideas are within; Hegel saw the inadequacy of the compromise,—he was of course aware of the opposition, but behind this opposition he discovered a unity,—*a priori* and *a posteriori* knowledge was one and the same thing, only viewed from different standpoints. The relation of the object thought to the

subject thinking is found in the evolution of the mind, for the subject thinking receives *a posteriori* knowledge by virtue of a process of evolution and so transcends the opposition between fact and ideas. Hegel asserted that all other metaphysical difficulties would be solved by the same monistic principle, as also could the difficulties in science; but with regard to these latter he realised that there was a very "hard husk" to break through, yet he was quite sure of the principle. He writes: "The nature of the universe, hidden and shut up in itself as it is at first, has no "power which can permanently resist the courageous efforts of the intelligence, "the world is intelligible, as it were, and is in union with our intelligence." Now when we come to view this fundamental doctrine of Hegel's, namely, the Union of Opposites, from a religious standpoint,—for any truth seeking to be universal must sooner or later justify itself to religion,—we find it in full concord with the purest and best religion that the world has ever seen, the religion of Christ. The unity of God and man is the kernel of Christian truth, Christ in His person being at once God and man, the two opposites, the Divine and Human closely connected, merged in Him. If that is the central truth of Christianity, and no Christian can deny it, the central truth of Hegel's philosophy is identical with it. He did not arrive at this perfect reconciliation by the study of Revelation, he did not seek to force the connexion, but steadily followed the glimmering light of truth till it broke into a glorious day. Moreover, when Hegel brings his fundamental doctrine into the realm of man's ethical and spiritual life, it meets with the same signal success. He, with logical reason for his guide, reached the same conditions as do the theologians who believe themselves led by the spirit of God in an especial and peculiar way. In company with the mystics and the divines, Hegel saw a very lucid and real meaning in the words which form the centre of Christian truth: "For whosoever would save his life shall lose, and whosoever shall lose his life for My sake, shall find it." Is this not the essential point, the innermost meaning of his philosophy? In man's life there is the positive and the negative, the self and the not-self, the two opposites with their ground of union—God. If we die to what is particular, to what is individual, we shall be born again to what is universal, to what is God-like; this, then, is the meaning of "dying to live." It is not the denying of one part of ourselves in order to fully realise the other part; but it is a dying to everything that is divided, partial, or contradictory, in order to live in unity and in God. Here, then, we have the essential doctrine of Christianity proved by a logical and philosophical method. Men are every day becoming more and more intellectual, more logical, more reasoning; man's intellect has discovered for him thousands of the wonderful secrets belonging to nature; to his intellect he owes his exalted life, art, literature, and science. Can he throw away this trusty staff on the threshold of his religious life and say he has no further need of it? No, he cannot. Christianity must be grasped not only by the emotional, spiritual side of man's nature, but by his reason and his intellect. Hegel has shown us how this can be done, his philosophy is all-embracing, monistic, true; he not only can find room

for the beautiful and the good in art, nature, and conduct, but he has a place for the evil and the ugly, behind all things there is the Eternal One. His religion does not admit into it the idea of an everlasting fight between God and Satan, nor his philosophy, the idea of a war between matter and spirit. If it required the gift of inspiration to write the Gospels and Epistles, no less does it require the same gift to understand the dark sayings in the Old Testament. Hegel, then, must have received that gift, for those strange words in Isaiah are philosophical truths to him: "I am the Lord, and there is none else. I form the light, and create darkness; I make peace and create evil; I, the Lord, do all those things."

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INDIA—RELIGIOUS, POLITICAL, SOCIAL—OF 1895.

I.

The White City has disappeared. The show of industry and art has vanished from sight. The august gathering of the Parliament of Religions lasted for a few days and ultimately dissolved. But the practical results of these movements live and are felt by us in whatever direction we turn our attention. The year 1893 gave to America congresses on politics, religion, science, and what not, all of them within a short space of six months. India is slowly passing through a similar condition, and the year 1895 will live in the memory of her people as being full of memorable events, religious, political, and social.

The growth of a nation, in order to be healthy, must include all phases of its life. The abnormal growth in one direction brings on diseases which are difficult to cure. Undue attention paid in India for centuries to the formal side of religion brought on subjection, incapacity to cohere as a nation, and many social evils. Happily, under the British Government, the study of history and politics has brought a large portion of the educated people of India to their senses, and the result is that India, at the beginning of 1896, is totally different from the India of 1857.

The great religious event of the last year is the Dharma-Mahotsava—the Religious Assemblage—held at Ajmere, in Rajputana, on the 26th, 27th, and 28th of September. Religious gatherings have taken place in India in the past on different lines. The Council of Ashoka, held in the third century before Christ, was an assemblage of Buddhist priests only. Neither the Jains, nor the Brahmins, nor other sects prominent in those times were invited to attend. The religious gathering of Akbar, the enlightened Mohammedan emperor of the sixteenth century was more cosmopolitan, indeed, but the number of religions represented was a small one, and,

besides, the emperor's object was to found a new religion, in which, of course, he did not succeed. It was reserved for America, for the enlightened people of the United States, and for the liberal workers in all religions of the union to inaugurate a movement in which representatives of all the great ethnic religions of the world were invited to meet in brotherly friendship on a common platform to admire and to love all that was best in the different faiths and creeds. In the words of Prof. Max Müller, "I repeat once more, without fear of contradiction, that the "Parliament of Religions at Chicago stands unique, stands unprecedented in the "whole history of the world."

But long before the Columbian Exposition was held and the World's Congresses Auxiliary was planned, a noble son of India, the great Káyastha reformer, now an ascetic, Swami Shivgan Chandji, had conceived the idea of convening a gathering of the leading religionists of India and asking them to present before a suitable audience the tenets of different faiths in connexion with vital problems of life in a popular form. But India, while it is the most tolerant of all tolerant countries, and the most conservative of all conservative countries, a new idea takes time to meet with the approbation of the people. And so it was with this. It was only in the latter part of September, last year, that it was actually carried out.

The objects of this religious movement were:

1. To promote the true religious spirit among men of all faiths.

2. To afford a common platform for the advocates of different religions where each can show to the best advantage the vital principles of his faith without in the least entering into controversy with or hostility to any other faith.

3. To place within easy reach of enlightened and educated men trustworthy information about every form of religion and leave them to judge of the merits of the same.

The idea was met with responsive co-operation from all parts of the country, and soon a reception committee was formed in Ajmere to organise means for receiving and accommodating delegates of different faiths, with Pandit Saligram Shastri, Sanskrit professor of the Ajmere Government College, as president. The programme and other matters were settled in a short time. Provision for the accommodation of delegates was adequately made. The north and the south, the east and the west sent their representatives.

At half-past eleven on the morning of September 26, representatives of eighteen different faiths met in the gardens of the Maharaja of Kishengad, where a special pavilion, with a platform, was erected. To this pavilion they repaired in the form of a procession, Pandit Saligram leading. The place was filled with an appreciative audience. A large gathering of all classes of people ready and willing to hear representatives of different faiths expound their respective tenets in all earnestness proved that the first object of the assemblage—that of promoting a religious spirit among men of all faiths—was fulfilled by the speakers as well as the audience.

With solemn prayer and invocation, the proceedings of the conference were opened by Pandit Saligram, who, in his able address of welcome explaining the objects of the gathering, offered the most hearty reception to the delegates, Preliminary formalities being over, R. B. Shyám Sundar Lál, Prime minister of the Kishangarh State, was appointed the moderator to preside over the deliberations of the congress. His inaugural address was pervaded by a spirit of large-heartedness and tolerance. He referred to the fact that religious reform and tolerance were the prime factors of a nation's civilisation, and that, leaving out of consideration the mere formalities and externals of a religion, the fundamentals, the essential principles of all the religions the wide world over were the same; that peculiar circumstances, local to a particular country, add formalities which are inessential to a country with different circumstances; that gatherings like this were sure to promote the religious spirit among all classes of people and would create and continue feelings of tolerance and respect for the different religions and faiths.

For three successive days addresses were delivered by the representatives of eighteen different faiths, Mohammedanism and Christianity included. On the last two days, in the absence of Mr. Shyám Sundar Lál, Mr. Fateh Chand Khabia, a Jain barrister and judge in Ajmere, presided. Hindus and Mohammedans, Jains and Sikhs, Arya Samaj and Brahmo Somaj, Vedantins and Vaishnavas, orthodox and heterodox, were all heard with the most perfect cordiality and friendliest attention. The second object of the religious conference—that of affording a common platform for the advocates of different religions, where each can show to the best advantage the vital principles of his faith without in the least entering into controversy with or hostility to any other faith—was literally and satisfactorily fulfilled.

The questions dealt with in the Conference of Ajmere are, indeed, very important, and any light thrown on them is sure to be of great good to the religious interests of India—aye, of the whole world. The restrictions of time and distance are removed in this nineteenth century by the steam engine and the electric telegraph, and the questions that now relate to the religious interests of India are as important to her as to the rest of the world. It is not hinted that the discussion or consideration of those questions now would throw more light than was done when the philosophers of the Orient grappled with the most knotty problems of life on the banks of the Ganges thousands of years ago, whose profound penetration and deep insight made Max Müller say: "If I were asked under what sky the human mind "has most fully developed some of its choicest gifts, has most deeply pondered on "the greatest problems of life, and has found solutions of some of them which well "deserve the attention even of those who have studied Plato and Kant, I should "point to India." But in an age in which the spiritual standard must be raised, the consideration of the mighty problems of life becomes an efficient means of leading us to the real or imaginary goal that is set before us by all the great religions of the world. The question of God, soul, transmigration, sin, bodily health, family

life, social life, revelation, mediator, saviour, incarnation, and salvation, are very momentous, and the discourses on these various subjects gave to the audience at Ajmere a unique opportunity of comparing the views of one faith with those of others. Comparisons made in private are generally tinted with prejudice unless the comparer is pre-eminently open to reason, But in a gathering like that in Ajmere points are urged on the minds of the audience which are generally ignored when one reads books simply to emphasise his preconceived views. Considerations which seemed trivial to him formerly are now placed before him in a new light and perhaps with a different interpretation. What formerly seemed essential may now appear formal and even unnecessary—nay, irrelevant. In this way the third object of the Mahotsava is fulfilled—that of placing within easy reach of enlightened and educated men trustworthy information about every form of religion, leaving them to judge of the merits of the same.

The closing addresses of the moderator and delegates were touching indeed. They met for a solemn purpose, for a holy purpose, for God's purpose, and it was in God's way, in a peaceful and loving way that they departed. They met to hear the words of wisdom from one another, and all addressed and were heard in a spirit of gentleness and tolerance. This was the universal worship, the tribute of our hearts that we made in spontaneous gratitude and devotion to the Infinite. Our worship in this sense had no voice, had no particular ceremony, no outward expression of the sense, but, it was the prostration of the soul before the supreme in adoration of that which is holy and pure, uuchangeable and eternal. We testified to the fact that religion, not *a* religion, is the very life and soul of man, and, when rightly understood, is answerable for our destiny here and hereafter. In India this fact has been known from earliest times, which has justly given to her the name of the Mother of Religions. It has answered the wide world over, I should say, for our spiritual regeneration and moralities of life, and has evolved among all the nations of the earth devoted lives, spotless characters, tireless regenerators about whose names the white light of immortality ceaselessly shines. This was the grand lesson that we learned at the Dharma-Mahotsava in Ajmere as much as at the Parliament of Religions in Chicago.

But the people of India, say our opponents, are merely speculative, visionary, unpractical. If one tries to reach the ancient literature of India and dive deep into it, he shall know what the great sages in the past have said about politics, law, war, and polity in general. True it is, and the Hindu has to confess most lamentably that priestly innovation and exclusiveness put India into dire distress and subjection; selfishness kept the masses in ignorance and dried up the source of material advancement. This, added to foreign rule, disintegrated the Indian peoples and made them politically valueless. Happily, under the British rule, in spite of many shortcomings of Anglo-Indian officials, India has taken a step in the right direction, and her political advancement is as wonderful as the religious.

VIRCHAND R. GANDHI.

BOOK REVIEWS.

LEHRBUCH DER NEUTESTAMENTLICHEN THEOLOGIE. Von *Heinrich Julius Holtzmann*, Dr. und Ord. Professor der Theologie in Strassburg. Freiburg, i. B. and Leipsic: J. C. B. Mohr. 1896. Lieferungen 1-4. Price, M. 1.50 per Lieferung.

New Testament theology has only recently been developed into a science. Formerly the dogmatic interest of the various denominations was too strong, and the New Testament was used simply for the purpose of procuring evidence of the truth of their particular doctrines. The name of Biblical theology as an independent discipline was used first in 1708 by Haymann, but it was not till 1787 that Gabler spoke of it as an independent science. His colleagues Lorenz and Bauer made a distinction between Old and New Testament theology from 1800 on, and they also suggested to Pölitz, Cludius, and Schwartz the idea of a scientific reconstruction of original Christianity. The more dogmatic interests disappeared, the more historico-critical investigations gained the upper hand. In connexion with this independent development of New Testament theology, grew up also the New Testament exegesis which from the direct bearing of a historically correct conception of original Christianity upon the present doctrines of the church proved to be of all-absorbing interest. Here must be mentioned such great historians as Neander with his compendiary knowledge of all ecclesiastical literature. He was followed by Reuss, the first theologian who viewed the New Testament under the aspect of an evolutionary process, claiming that there was first Jewish Christianity, then Paulinism and other attempts at reconciling Hellenism and Judaism, and lastly the theology of St. John. Upon this foundation the school of Tübingen represented by Schwegler and Baur took its stand. The latter places the doctrine of Jesus and of the Apostles at the beginning, and contrasts in the first period of the development of the church the doctrines of Paul and Saint John of the Revelation, which are followed by conciliatory attempts represented in Mark, Luke, and the Paul's Epistles to the Hebrews, Ephesians, Colossians and others. The latter are a transition to the formation of the dogmas of the Catholic Church, best represented in the pastoral letters and in St. John. Hilgenfeld sides with Baur, while a reaction against the Tübingen School is represented in the names of Ewald and Ritschl. In more

modern days we have the works of Weizsäcker, Hausrath, Oosterzee, Köstlin, Weiss, Beyschlag, and especially Pfleiderer.

Holtzmann is one of the most prominent investigators and interpreters of the New Testament, and there is no one better informed in this line of work than he is. His *Lehrbuch* and his *Handcommentar* to the New Testament are the best that can be had, and are recognised as such. The author is the man to give us also a *Lehrbuch* of New Testament theology.

Professor Holtzmann's present work, which has now reached four instalments and will be perfected in twelve, is, like all his other books, a concise and impartial summary of the present state of investigation. He condenses the work of his predecessors and presents rather the general advance made by them as a whole than an investigation of his own.

The four instalments before us contain two parts: first, Jesus and the Evangelists; and secondly, Paul and the Post-Apostolic literature. Neither is complete in the copy before us, the former breaking off abruptly at page 144, the second at page 240.

After a review of the literature of New Testament theology and a sketch of its development as an independent discipline, Holtzmann characterises the period of Nomism in the history of the later Judaism. He describes, according to the various views advanced, the contrast between Phariseeism and Sadduceeism, the modes of Jewish tradition, the method of interpreting the law, the development of the Apocalyptic literature, which is a product of the disappointments and sufferings of the Jews who fulfilled the law punctiliously while God did not seem to make good his promises. But the end was not yet; God can be relied upon. Therefore they hoped for a Messiah who would take a terrible revenge on the heathens, restore Israel to its political independence, or even make it the ruler of all nations. Thus the Messianic idea assumed definite shape and led to various conceptions of the nature of the Saviour who, however, was always regarded as a political restorer of Israel. Some thought that he would be a scion of David's house, while others, especially the priestly aristocracy, expected him of the tribe of Levi. The former gained the upper hand, but such were the views common among the people, that a sister-in-law of Herod the Great could think of finding the Messiah either in her husband or in one of her sons. Moral qualities of the Messiah and superhuman features were not expected of him. The people pictured him in their minds rather like Judas-Maccabee than like any one of the Prophets.

Since Alexander the Great the Jews had spread among the nations of the Roman Empire without surrendering their religion and Jewish customs. They became mediators of the monotheistic idea and helped to prepare the world for the acceptance of Christianity. The translation of the Old Testament into Greek, commonly called the Septuagint, was a condition of the *pleroma*, the fulfilment of the times. Without the Greek Bible we might have had the provincial literature of an Aramaic religion, but no New Testament theology. All Greek sages became greatly inter-

ested in Judaism on account of its stern monotheism, and many joined the Jewish faith, without, however, accepting either circumcision or the Mosaic law. They remained mere guests in the synagogues of Israel and a few only became proselytes.

While thus the Greeks were prepared for receiving a religious revelation that would come from the Jews, the Jews of the *diaspora* themselves became acquainted with Greek philosophy. And they were astonished at the purity and precision of Aristotle and the grandeur of Plato. The doctrine of the immortality of the soul so plainly set forth in the Phædo made a deep impression on them, and the result was a peculiar literature in which Greek and Jewish thought were blended, leading on the one hand to such Apocrypha as the Book of Wisdom and on the other hand to the philosophical conceptions of Philo, who developed the idea of the divine Logos.

By the side of the conservative Pharisees and the Hellenising Sadducees, a sect arose, apparently of foreign growth, the members of which called themselves Essenes. Their ascetic tendencies are un-Jewish; their reverence for the light and the sun point to Parseeism; their condemnation of the oath and of slavery reminds one of Neo-Pythagorism, and yet they are older than the Neo-Pythagorean school, for we have evidences of their existence in the second century before Christ. Thus they may be regarded as an independent but parallel development of the tendencies which prevailed in the whole Roman Empire and produced such philosophies as Neo-Pythagorism and Platonism. The underlying theory in both Alexandrianism and Essenism appears to be an endeavor to get rid of all that is sensual and to come into close contact with God who is conceived as pure spirit.

The main problem of the New Testament theology is apparently the personality of Jesus himself. Holtzmann does not believe that the character of Jesus can be explained as a myth. The mysterious power which Jesus manifests is so original, so peculiar, so individual that it could not be the product of speculative thought. We are confronted here with a reality, and everything we read in the synoptic Gospels about Jesus tends to corroborate the genuineness of the picture. The religion of Jesus is not the product of school doctrines. He who would try to explain his appearance as a combination of the conflicting theologies of his time will miss the most characteristic feature of his life. Jesus apparently nourished his soul at a well of living waters and did not draw his inspirations from books. Thus nature is mirrored in crystal-clear reflexion in his speeches. His imagination does not suffer from Oriental exaggeration. His mind is not distorted by Rabbinical wit or subtleties, and there can be no question about it that he is the child of Galilee, of the country which is described as a continuous garden where palms and figs and flowers grow. If he had grown up in a city like Jerusalem he would not have introduced similes and invented parables of provincial life as he did. His native country is the background of all his speeches and only a Galileean could expect to find figs at Eastertime in Jerusalem. There is nothing gloomy in his views of nature. He speaks of God's sun and its radiance, of the birds under the sky, and the flowers in the fields,

of the rain that pours down on the just and the unjust. Any one who uses such language is in no danger of the theologian stifling the man.

The life of nature apparently made a deep impression upon Jesus, but he concentrated his attention even more upon the life of man; and here again we find the social conditions of Galilee, not the city-life of Jerusalem, nor views which might be uttered in the schoolroom. Jesus was familiar with the joys and sufferings of the country and the people, and thus he was enabled to voice the deepest religious sentiments. God was to him like the house-father, and there are many pictures of family-life in his parables. He speaks of the children sitting round the table with their parents, the dogs waiting for the crumbs that are thrown down to them, and when it is dark, of the light that is put on a candlestick, which gives light to all that are in the house. Neighbors and friends are mentioned who are invited on festive occasions (Luke xv., 69). The children sleep in the chamber together with their father (Luke xi., 7); and he does not tire of speaking of children as being nearest and dearest to his heart.

By the side of these friendly pictures of family life Jesus also mentions the oppressive social conditions of the laborers, servants, or slaves, and of the hired workman in the vineyards. He frequently mentions the good man of the house who is the head slave, the overseer of the other servants, either proving himself to be reliable or being a tyrant oppressing his companions. The slave girls are alluded to who work the hand-mill and who must sleep two in a bed. All of them are subject to the cruel laws of the times and depend upon the will of their master. When they have tired themselves in the fields they are still kept busy in the house (Luke xvii., 7–9). They serve at table, and it is a distinction if they are entrusted by their master with money affairs. Jesus repeatedly introduces the master of the house in his attitude of going over their accounts and computing the returns of the entrusted money. When the master travels the servants wait for his return, and remain awake during the night.

But the hardships of slavery which are introduced without further reflexion in the sermons of Jesus, are not the worst features of the social conditions of those days. The greatest misery is represented in the cripples and the beggars on the streets, the tramps on the highroads, the thieves in the cities, the robbers in the woods, the malefactors who carry their own cross, imprisoned debtors, etc. We learn of the transactions of usury, bills of indebtedness, the severity of creditors, the contentions between parties on the way to the judge, punishments by the court, etc., etc.

Yet while Jesus describes scenes from life such as he must have witnessed in his childhood and early youth, he was at the same time not unfamiliar with the Scriptures. His speeches show a special familiarity with Deutero-Isaiah and also several of the Apocryphal and Apocalyptic writings. In Luke xi., 49, he quotes from a Book of Wisdom which is no longer extant, and there are passages in Matthew and Luke which contain echoes of Jesus Sirach.

Jesus must have learned reading and writing, for we are informed that he ead chapters from the Prophets in the synagogue and addressed the Pharisees reeatedly with the words: "Have you not read?" He quotes from the history of is people and is full of Biblical reminiscences. It is true that he makes mistakes n his exegesis, but he proves himself a genuine prophet by the freedom with which e introduces his interpretations. The Scriptures are to him only incidental and ccessory corroborations of the religious experiences which he had had himself, nd thus he shows an assurance and superiority, which, although he never places imself above the Scriptures, makes it possible that he speaks with authority. The criptures are to him like a glass in which he sees his own face and behind it the ace of God.

The influence of Essenism on Jesus has been a matter of dispute. His conemnation of the oath, his celibacy, and the communism involved in the idea of he surrender of property, the redundancy of temple service and bloody sacrifices ndicate some connexion between Jesus and Essenism; but Holtzmann is inclined o regard these coincidences as being due to the moral ideals of the times, for Jesus vas very different from the Essenes, as he did not place his light under a bushel s they did in their retirement. They represented a separatistic sect while he ived in the world and communicated with all the people, scribes and Pharisees, ublicans and sinners.

The Pharisees were apparently that party with whom Jesus in the beginning f his career was most closely connected. He appears as a guest in the synagogues. He knows their methods of teaching, he uses their modes of argument and proves his case on the authority of Scriptures, in exactly the same style which they were vont to use. He discusses problems such as that proposed to Hillel, Which is the irst and the greatest commandment? (Mark xii., 28; Matth. xxii., 36.) He inroduces the term "righteousness" as frequently as did the Pharisees, only that he leepened the meaning of the word: It is still the dominant theme in the Sermon on the Mount. Where he combats the Pharisees, he does so with their own weapons. He discusses the worth of almsgiving and the reward in heaven. He agrees with the Pharisees on the doctrine of resurrection against the Sadducees, and it is not mere chance that Paul the great apostle who completed the mission of Jesus came also from the school of the Pharisees.

But the main difference between Jesus and the Pharisees is his more natural and more human conception of the righteousness of the law. In his explanation of the law, his own genius asserts itself. Imbued with the experiences of real life he applies his religious views to the conditions that surround him, and is free from all scholasticism and scholarly prejudices. He is not a professional scribe but a selftaught man who bears the prototype of his religious ideals in himself, and this gives him a self-reliance which cannot be acquired by book-learning. His belief in God is not born in the storms of despair, but it appears like sunshine upon the quiet sea of Galilee.

Considering the character of Jesus, such as is here described, it is natural that he possesses no special method of teaching. He does not use the abstract definitions of the schools. He shows no doctrinary reflexion, nor any dogmatic system. He is a man of the people and not, as St. Paul and St. John, a theologian. He never cares to solve problems of science. He even neglects the order and consistency of his thoughts. He is always bent on solving practical questions which he does by his faith in a world of divine truth. He never aspires for lucidity, but always for a popularly impressive expression of his thoughts which are communicated as directly as possible. We must understand every single word from the motives which prompt it, and in order to judge of his personality we ought first to be able to translate his speeches back into Aramaic, for they have suffered greatly by being transcribed into a Greek garment. This is a work which has only recently been begun by Arnold Meyer.

The originality of Jesus appears mainly in his application of religion to practical life. As the roots of his view of nature and of man are taken directly from life, so he applies them directly to the needs which he sees about them. He is more a child of nature than the theologians of later centuries would have it.

While Jesus has a deep reverence for the sacred traditions of his nation, and while he is willing to fulfil the law, he sees no need of obeying all the various injunctions which the Pharisees and scribes prescribe. The law as it was understood in Jesus' time was a heavy burden upon the people. It presupposed a study, for who could know all the rules about prayer, about washings, about the tithes, sacrifices, and ceremonials? The law of the Jews had become a religion for the rich. It was utterly impracticable for poor people. The parents of Jesus themselves were unable to comply with all the demands of the law, for we know that only once they travelled to Jerusalem, a journey which, according to the law, had to be made three times a year by a good Jew. We have the express statement that Jesus himself did not observe the fasts and that he did not hesitate to break the Sabbath. The mass of the people lived in utter ignorance of the details of the law, and considering the burden of the law, we can now appreciate that Jesus praises the unlearned and uneducated by saying "Blessed are the poor in spirit." He comes with a Gospel for the poor. He addresses not the pious Jews only, but the sinners, those who by the pressure of circumstances no longer continued to observe the law and formed a class by themselves upon whom the orthodox Pharisee looked down with contempt. The parents of Jesus themselves probably sat down to dinner without washing their hands according to the Levitic injunctions, and it was a matter of course to him that they did not thereby defile themselves. It must sometimes have been difficult for a carpenter when at work to obey the circumstantial commands of eating his meal in the orthodox fashion. Jesus knew that the law could mean purity of heart and not of hands, and he understood that not the food that enters the mouth but the words that come out of the mouth can defile the character of a man.

It is the directness of his experiences which conditions his superiority and the breadth of his mind shown in his communion with the pious Jews as well as with the publicans and sinners; and this is not the product of study, and of consideration, but natural instinct, which becomes more and more a conscious opposition to the narrowness of Phariseeism. Thus the gist of his doctrine is contained in the words, "The poor have the Gospel preached to them," and St. Luke says: "The Son of Man is come to seek and to save that which was lost." But his salvation does not consist in urging the severity of Phariseeism, but in preaching the Kingdom of Heaven, which since those who are invited do not come, will be inherited by the crippled, the lame, and the beggars from the street.

So much for the first part, and the most important problem of New Testament theology. We hope to recur to Professor Holtzmann's work as soon as the remainder is published. P. C.

DIE PROPHETISCHE OFFENBARUNG NACH WESEN, INHALT UND GRENZEN. Unter dem Gesichtspunkte der alttestamentlichen Weissagung geschichtlich und psychologisch untersucht von *Dr. Paul Schwartzkopff*, Professor in Wernigerode. Giessen: J. Ricker'sche Buchhandlung. 1896. Pages, 169.

A new theology is being built up, not in the quarters of the old rationalism, which in Germany are gathered in the *Protestantenverein*, but in those circles where the orthodox traditions prevail; and among modern theologians Paul Schwartzkopff has offered to the world in these latter days most valuable contributions which are distinguished by philosophical method and critical ability. Men like Kuenen, Wellhausen, Cornill, Harnack, Holtzmann are historical scholars of first degree; Schwartzkopff's specialty lies in another field; he is sufficiently versed in the works of these great pathfinders to be perfectly at home in Biblical theology, but he concentrates his investigations upon the fundamental questions which are to be decided as a matter of principle rather than as a historical fact. For this purpose he wrote his treatise on the fallibility of Jesus.[1] Here the historical problems are brought under a philosophical aspect, in which, in the spirit of the present age, psychological considerations are most prominent. The present treatise on "Prophetic Revelation" is quite similar in kind and forms an important part of the whole system, promising to be very acceptable to theologians as the best solution of the various difficulties into which the traditional interpretation of religion, through the rapid progress of all the sciences, has been drifting.

Schwartzkopff approaches the problems of exegesis, text-criticism, and interpretation not by expounding the sundry individual passages, but by selecting salient instances and developing the characteristic features of all of them. In the book before us, he undertakes to determine the nature of the prophetic revelation in both

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[1] *Konnte Jesus irren?* Unter dem geschichtlichen, dogmatischen und psychologischen Gesichtspunkte principiell beantwortet. Reviewed in *The Monist*, Vol. VI., No. 3.

its form and its substance; he seeks to show how the purity of the substance of the revelation (*der Inhalt*) is dependent upon its form, and that thus in its form it must find its natural limits. The prophet has a mission that appears in his sermons, which are partly threats of punishment, proclaiming God's wrath on account of the sins of the people, and partly promises of restoration on the condition of penitence and obedience. In prophecy the national conscience finds its utterance, and thus the prophet is a politician. To be sure, he does not make himself the head of a faction, nor does he organise a party for political ends, but he voices the people's indignation at social wrongs or political errors committed by those in power. He is the guardian of the souls, the *Seelsorger* and pastor of the people and there is in the prophet a subjective assurance that what is of God will stand, but what is ungodly will fall. This in fact is the burden of all prophecy, which accordingly is defined as "the expression of the moral-religious sense applied to the destiny of God's people and the realisation of God's kingdom on earth" (p. 167). But in recognising the divinity of the substance of prophecy we should not overlook that it is poured into vessels of clay; the form of prophecy is individually and historically conditioned, and every prophet in portraying the consequences of God's wrath and the promises of his mercy, colors his picture with the paints that he finds in the paint-pots of his home (p. 101). Thus the human element is introduced as a matter of necessity, and with it come error and fallibility. In order to be a prophet in whom the perfection of truth is reached, the prophet must have attained to the perfection of the God-man, which can be said of none of them. Their vision is more or less dimmed; they see the externality of things and have not as yet understood that the external forms of worship and of the kingdom of Israel are transient and indifferent in comparison with the foundation of a kingdom of God on earth that would be of a spiritual nature without any theocratical forms. Thus the prophets are subject to error in proportion to their inclination to see the external and to mistake the external for the spiritual. The letter of prophecy is not the thing to be minded, but the burden and spirit. There is a nucleus of truth, however, even where error prevails, and this nucleus of truth (*Wahrheitskern*, p. 102) consists in the proclamation of the message of the coming of the kingdom.

The most orthodox theologians freely concede the errors of prophecy. Schultz (in his *Alttestamentliche Theologie*, fourth edition, 1889, page 267) says:

"Tyre was not, as Isaiah prophesied, conquered by the Assyrians in order to "rise after seven years to its former prestige and to donate the fruits of its rich com-"merce to Zion (Isaiah, xxiii, 1, 15 et seq.; Ezekiel, xxvi, 1–28 x; see also Smend, "p. 174). Babel did not fall under the assault of Koresh, and was not doomed to "destruction as was prophesied by the prophets of Israel (B. J. xiii, 14; xxi, 40–66). "Damascus is still standing even to-day and has not been taken off the earth. The "Egyptians were neither conducted to Assur nor to Babel into exile (Isaiah, xvii, "1; ix; Jer., xlvi; Ezekiel, xxix). Egypt and Assur were not united together "with Judah into a triple kingdom of God (Isaiah, xix, 23 et seq.). Jerusalem was

"not restored on the return from the exile, as the prophets had hoped (B. J., xxxv, "xlii, xlviii, liv, lx, lxii). A victory of the tribe of Judah over Phœnicia never "came true (Joel, iv, 4). Thus almost every prophecy exhibits to him who ex-"amines it closely a vista into the future which remains unfulfilled. And yet all "that these men of God hoped was in connexion with times which are now passed "and can never return, and thus it can never be fulfilled in the future. What "Isaiah of the exile prophesied can never be fulfilled, for all the conditions in "which he expects his people to develop are gone once and forever, and the same "is true of all the prophetic descriptions of the blessed times to come. . . . If all "the particular traits of his prophecies are left out or interpreted in another sense, "one should be honest enough no longer to speak of a fulfilment of the prophecies "in the proper sense of the term."

The same author who thus rejects the idea of a literal fulfilment of Old Testament prophecy adds: "But Jesus has given another and a higher fulfilment of the "Messiah ideal in which a national Israel has no longer a place. In this sense he "had fulfilled the prophecies in the deepest meaning of the word, but at the same "time he has destroyed them in their temporal form and interpretation." (See also Smend, p. 171).

In the same way Ewald emphasises the importance, not of the form, but of the religious substance of the prophecy, and in this sense Franz Delitzsch, too, recognised the limits of prophecy. He says in his *Kommentar*, p. 256:

"The submission of the Ethiopian warrior was the beginning of what Isaiah "had prophesied, but the land of the Nile was subjected under Asarhaddon and "Asurbanipal, his son, the conqueror of Thebes (Nahum, iii, 8–10). Judah's ex-"pectation of Egypt became fatal to Judah as Isaiah had prophesied, but the ca-"tastrophy of Jerusalem was not the end of Assur; and the expeditions of Sargon "and Sanharib were not as yet the end of Egypt. The triumphs of Jahveh and of "prophecy concerning Assur did not lead to the conversion of Egypt. In all this "the fulfilment of prophecy leaves an element of the human, drawing the distant "that is hoped for into the nearer future. All fulfilment is divine, prophecy, how-"ever, is both divine and human."

These theologians and others of equal prominence concede the presence of error in prophecy, and yet endeavor to remove the objection of fallibility from genuine prophets. It is on this ground that Smend would not recognise Nahum and Habakkuk as genuine prophets, because their prophecies remained unfulfilled. Kuenen in the first part of his work *De Profeeten en de Profesie* (Chap. 5, 6 and 7, pp. 114–320) devotes several chapters to an investigation of prophetic errors, and shows extraordinary depth and precision in his terms; and Schwartzkopff finds himself in sympathy with him on the basis of an independent investigation of the same field.

In agreement with the healthy atmosphere of Schwartzkopff's thoughts we find the theory that regards prophecy as a second sight rejected. Schwartzkopff says

(p. 164) that there are only an evanescent number of passages both in the Old and the New Testament which seem to allow an interpretation of prophecy as second sight. But in all these exceptions the reliability of the tradition is subject to justifiable doubts. Visions, it is true, appear not only in the beginnings of prophecy, but exceptionally, though more seldom, in its higher development. Nevertheless, it is not the typical form of prophecy, and where visions are introduced, it is not the form of the second sight which makes them prophetic, but the religious purport of the vision.

The main purpose of the present pamphlet, which shows its close connexion with other investigations of the same author, points beyond the prophets of Israel. That purpose is to find a clue to the fundamental problem of Christianity, which consists in a definite and truly philosophical comprehension of the significance of him who is the ideal prophet—Jesus of Nazareth. P. C.

DER KAMPF UM EINEN GEISTIGEN LEBENSINHALT. NEUE GRUNDLEGUNG EINER WELTANSCHAUUNG. Von *Rudolf Eucken*, Professor in Jena. Leipsic: Veit & Co. 1896. Pages, 400. Price, M. 7,50.

The aspiration of *The Monist* is the establishment of a new world-conception and the gathering of all the forces in the philosophical and scientific world that tend in this direction. We have repeatedly called attention to the importance and indispensability of a definite world-conception, insisting that on the character of our world-conception depends the character of our religion, our ethics, and of our main conduct in life. The detail-work of the sciences is not the aim and end of the scientific tendencies of the present age. The specialisation of the sciences must lead back to a unification that bears within it a higher and deeper conception of the purpose of life. Professor Eucken has similar aims, and several passages of his book are closely allied to the spirit of editorials that appeared some time ago in *The Monist*, especially "The Clergy's Duty of Allegiance to Dogma and the Struggle Between World-Conceptions" (Vol. II., pp. 278 et seq.), "The Message of Monism to the World" (Vol. IV., No. 4), and others.

Professor Eucken fails to find in the present offerings of philosophical labor a definite spiritual content of life. He sorely feels the need of the independence, the character, and the omnipotence of spiritual life, and he proposes to purify and deepen the life-process so as to make room for greater experiences. In this sense he has written all his previous works, and the present book is devoted to the same task. He is conscious of preaching to a minority, for the tendencies of the present age are predominantly under the influence either of naturalism or of exclusive specialisation. By naturalism he understands a philosophy which endeavors to resolve all events into physical processes, while to the specialist a consistent world-conception appears an empty Utopia. Thus naturalism would be identical with materialism or mechanicalism, and specialism with agnosticism.

Professor Eucken endeavors to avoid the Scylla of physicalism and the Charyb-

dis of agnosticism, and to get beyond the negations with which they embarrass philosophical aspirations. He proposes to emphasise again the importance of the whole, of that which is a matter of principle, and in this sense he re-establishes the notion of an independent spiritual world.

In the first chapter he shows that man grows beyond and above nature. Nature, that is to say, the physical play of forces, is conquered by man the more he understands it, and thus the supernatural rises into existence. The natural is a life of "pure sensation and affection," but beyond the natural lies the higher empire of the spiritual, and the spiritual is not a mere appendix to the physical. It is a new creation, constituting a movement that comes from the whole and tends towards the whole.

The naturalist would exorcise from nature all psychical magnitudes, and would reduce reality to a soulless mass of motions. He looks upon the world as a complex of small and smallest elements, and regarding all happenings as a purely mechanical interaction of these elements with the exclusion of all internality, he denies all valuations (*Werthschätzungen*) and every purpose as mere phantoms. But the spiritual world is a new creation above the physical world, the wealth of which is unlimitable.

We observe three periods in the evolution of man. First, the origin of an independent spirituality, which, however, finds itself embarrassed by its surroundings, by sensuality, and by the grossness of the lower spheres of the physical. This manifests itself as a resistance against the development of the spiritual, which leads secondly, to a transfiguration of its surroundings and to the foundation of a new reality. The third period is characterised by the victory of spirituality over the complications to be overcome.

Man's soul-life is in one respect a mere continuation of the natural process, but in another respect it represents a new beginning. It cannot, however, cut itself loose from its surroundings, but must utilise the data of external nature. It must not attempt to fly from the objective world, but must subdue it and appropriate it. The spiritual world is not a perfected existence. It is not a world beyond, as it was formerly conceived, but it is a going beyond the physical. It is its transfiguration and consecration, yet it is not the mere product of a peculiar condition. It is not the private affair of mankind, but it is the revelation of the inner movement of the All. It opens before our mental vision the depths of the significance of existence. It is an evidence and manifestation of the spiritual nature of being, and leads to an emancipation of the spirit of man. It is a deliverance from the merely human or the puny human, and points towards the solution of the deepest mystery of the world.

A similar solution of the problem has been proposed by Plato in his doctrine of ideas. There we learn that there is a spiritual world which is not rooted in the human alone, but which has an absolute existence. The true, the good, and the beautiful are ideals that have existence in themselves. Spirit is the measure of all

things, and not man. The Sophistic philosophy is a huge error, and this same Sophistic philosophy is very powerful to-day. It endeavors to make man the measure of all things, and this view remains purely Sophistical, even though the single individual may be replaced by society, or a great number of individuals by the average man, or the *Zeitgeist*. All these theories of the day represent the purely human and overlook the importance of the deeper reality from which the human has developed. To be sure, the peculiar form of Platonism has become untenable in the course of further experiences and considerations, but the substance of it remains, and may be called the existence of an independent world of spirit.

The spiritual world forms a contrast to the physical or material world from which it arises. But if the former tries to ignore the latter, it cannot escape punishment. The spiritual life is dependent upon the surroundings of reality and cannot dispense with it. It must struggle with it and conquer it, and through its conquest rise to greater heights. If the surrounding reality be neglected, our experience in the history of philosophy from Plotinus to Hegel proves that the spiritual life grows abstract and dry. It degenerates into soulless formalities unless it be separated by experience. The contrast that obtains must not be denied but must be conquered, not by a compromise but by the appropriation of the material through the spiritual.

The contrast between the spiritual and the real shows itself in all departments of life, and appears in science as the eternally renewed struggle between empiricism and rationalism, which are disparate life-processes that exclude one another and not merely two sides to one and the same reality. The problems offered by the contrast in which the spiritual finds itself with the sensual and material, find their solution in various propositions. Some try to deny the existence of evil. Such is the philosophy of optimism as represented by Leibnitz. He thinks of denying the reality of evil by inducing man to change his position and view his life from the standpoint of the All. Philosophy, he claims, will recognise the harmony of the world as soon as "the eye is placed in the sun." This is the way in which optimism endeavors to free the world from irrationality. Suffering is regarded as a means of education, and even the moral evil or guilt is justified in the scheme of salvation. But we cannot regard evil as a mere accidental phenomenon, and the more the dialectic of optimism is accepted the more artificial appears its position.

Another solution is proposed by those who fly from the world of misery into the realm of the beautiful. Finding it impossible to deny the existence of evil, they seek a harmonious world in the empire of art, but even this is futile for art cannot avoid the abysses of misery, doubt, and sufferings, for wherever it does so, it becomes shallow and trivial.

A third solution is offered by naturalism which regards an independent world of spirit as an illusion. But naturalism, too, is untenable, because it chokes all joy of work, and is a resignation and suppression of all spiritual life. It leads to another solution which is called pessimism.

Pessimism is the resignation of all happiness and leads through a contemplation of the vanity of the world to a contempt for the world, which sometimes appears as a conquest of the world. Pessimism has many advantages over optimism, but its practical consequences are impossible. Whenever pessimism attempts to end in absolute negativism, it will quickly come into contradiction with the real nature of ourselves. By adhering to the principle of negation it surrenders reason, the norm of the spiritual, and the impossibility of such resignation becomes soon enough apparent. A man may resign for himself, but he cannot resign for the totality of mankind and for the whole of the spiritual world. He can resign his subjective happiness. He cannot give up the ideality of his nature. The endeavor to live and to work is not merely physical; it is also metaphysical. We have not only to maintain our individual, and, as it were, "point-like" existence, but also the spiritual process which ensouls us, for we are co-workers in the design of a spiritual world, and we wage a battle for our soul. The whole life of man, from this standpoint, appears as a duty, which is not a creation of our own arbitrary will, but depends upon the inner necessity of our spiritual existence and upon our relations to the invisible order of all things. Misery and suffering are indispensable in the struggle for a spiritual existence, the aim of which does not lead to nothing, but to the construction of a new world. The old ego may be destroyed, but life is resurrected in a new and spiritual self. The lower impulses of life may be rooted out, but the higher aspirations will persist, and their reality becomes the more apparent. The deepest tendency of life is not identical with the yearning for selfish pleasure, and the energetic struggle for life is possible in full contrast to the lower hunger for life, because man in such cases does not stand up for his own individual cause alone. Thus, the reality of evil does not disappear, but loses in its predominance and supremacy in life.

Thus, it is not mere existence which we aspire for, but we must give to existence a content which is the creation of a spiritual world with spiritual significance. Upon this basis a new world-conception must be created which will renew the old ideals that are found in religion, which is not a mere sentiment but endeavors to build up the life of the spirit. Eucken would not confine himself to the forms of our traditional religion, but declares that philosophy should take a view of the whole from a more general standpoint. Yet he feels himself in agreement with the spirit of religion, which is expressed in its ethical aspirations. P. C.

GRUNDZÜGE DER WISSENSCHAFTLICHEN UND TECHNISCHEN ETHIK. VON *Dr. Fred Bon*. Leipsic: Wilhelm Engelmann. 1896. Pages, 166. Price, 4 Marks.

Dr. Fred Bon's position is perhaps most clearly characterised on pp. 14–15 of his pamphlet where he declares that every individual of a species must on the one hand compete with all other individuals of the same species who have the same wants and need the same means for the satisfaction of their wants, and on the other hand struggle against individuals of other species, who are either utilised for his

benefit or destroyed to provide him with food. The former condition produces a tendency to hostility or isolation, the other a tendency to mutual approach and combination. Thus all life is dominated by "isolation and conclusion," and our author finds "the ethical maxim in conclusion" as against "isolation which is the maxim of egotism." Thus he formulates the definition of ethics, which is the main result of his considerations in the preface (p. 4), as "a superordination of the conclutory interests." The term "conclutory" is original with the author and cannot (from a philological standpoint) be regarded as a happy formation. Since the author intends to elevate ethics, which so far has been a mere science, to an art that should be "the most powerful branch of social politics" (p. 11), he proposes to lay down the outlines also of the "technic ethics," which is "the noble task of the ethics of the future."

The contents of the booklet are subsumed under the headings of "the law of moral evolution" and "the raising of mankind" (*Menschheitszucht*), the latter containing some indifferent discussions of sexual love and various other moral considerations regarding the place of the individual and its individuality in society, moral commandments and an appeal to voluntary complaisance, the influence of moral ideals, etc. On the last page of the book we are told that ethical conflicts will be decided not by arguments or logical deductions but by action and energy. The strongest will conquer.

The author quotes Nietzsche, Wundt, Ihering, Hegel, and Schopenhauer indiscriminately and remains always on the surface. He scarcely touches the real problems of ethics, which is not a "super-ordination of the conclutory interests," not a mere submission to the common will of society (*Gesammtwillen*). Is it not possible, nay, even a frequent occurrence, that one individual is morally right in opposition to all others? It is true that the strongest will conquer, but the question is who is the strongest? Is the tiger stronger than man, and is there no strength whatever in logical argument or in truth? P. C.

SÖREN KIERKEGAARD ALS PHILOSOPH. By *Harald Höffding*, Professor der Philosophie an der Universität Kopenhagen. Mit einem Vorwort von Christoph Schrempf, Lic. Theol. Stuttgart; Fr. Frommanns Verlag (E. Hauff). 1896. Pages, 170. Price M. 1.50.

GUSTAV THEODOR FECHNER. By *Kurd Lasswitz*. Stuttgart: Fr. Frommanns Verlag (E. Hauff). 1896. Pages, 204. Price, M. 1.75.

HOBBES LEBEN UND LEHRE. By *Ferdinand Tönnies*. Stuttgart: Fr. Frommanns Verlag (E. Hauff). 1896. Pages, 232. Price, M. 2.00.

Imitating a practice which has been extensively developed in America and England, a German publishing house has begun the publication of a series of *Philosophical Classics*, being monographs on the life and work of the leading philosophers of all times. The series, which is edited by Prof. Richard Falckenberg, of Erlangen, begins with the three volumes before us, and will be supplemented by the

following: "Galileo," by Dr. Natorp, of Marburg; "Bayle," by Dr. Eucken, of Jena; "Hume," by Dr. Riehl, of Kiel; "Kant," by Dr. Paulsen, of Berlin; "Rousseau," by Dr. Höffding, of Copenhagen; "Feuerbach," by Dr. Jodl, of Vienna; "Auguste Comte," by Dr. Windelband, of Strassburg; and "Spinoza," "Hegel," "Schleiermacher," "Herbart," "D. F. Strauss," "Herbert Spencer," and "Fr. Nietzsche," by other competent writers. It is intended to publish from three to four volumes yearly. From its cheapness and promised solidity the series will doubtless be a valuable acquisition to the popular literature of the history of philosophy, and although some of the subjects have been much overworked, there are several concerning which it would be difficult to find the same information in other places. This is notably the case with the three initial volumes of the series—"Fechner," "Hobbes," and "Kierkegaard." These three philosophers receive here excellent treatment at the hands of recognised authorities, who have, in addition, suggestive material of their own to offer.

The personality of S. Kierkegaard, although a commanding figure in Danish life and thought, is little known outside the boundaries of his native country, and, if we except the accidental acquaintanceship made by superficial students of Danish literature, even this knowledge is shared only by men of kindred spirit, whose aspirations run in the same channel. Of that great movement which has now for a quarter of a century been slowly gathering irresistible force, and whose aim is to reach a juster and more practical conception of the laws regulating human conduct, and particularly to harmonise the traditions touching this matter with the reasoned thought of the present, Kierkegaard was one of the greatest forerunners and most powerful exponents. The importance and power of Kierkegaard, like that of Socrates (he was the Socrates of Copenhagen), lies mainly in his personality. The mainspring of his entire thought and action was his colossal hypochondria, his distinctest patrimony, stamping every lineament of his life. His subjectivism in philosophy, his individualism in ethics and in religion are its logical issues, and in it, too, we find the full psychological explanation of the scheme of philosophy which he elaborated. His works are numerous and bear mainly upon the burning ethical problems of existence. They have all an intensely practical bearing, and, in style, the incisive forcefulness which comes from straightforward and honest effort. His prose, direct, homely, and vivid, joined to great persuasive power, wealth of metaphor, satire, and invective, stands unrivalled in Danish literature. If he is not more widely known it is mainly because of his singular excellence in this regard. For although some of his work has been translated into German, like Carlyle and Emerson, he must be read in his native language to be adequately appreciated—and students of Danish are few.

As to his philosophy, its fundamental features are determined by the predominantly religious cast and effort of his thought, which studied psychology and ethics merely as the propædeutics of a mode of life. His interests were never purely theoretical or scientific, but ethical, educational, and salvational. It is the main and

only proper aim of thought, he contends, to discover the methods by which man is best fitted to lead a moral life in this world. He attempted this by first seeking a method of life for himself and afterwards establishing its validity for others. He regarded it as his duty "to raise difficulties" in the world of thought, which has, by the way, always been the philosophical method, and to exhibit the breaches between the logical consequences of ideas and the practical compromises which the world, by the exigencies of historical evolution, has been forced to make. He was bent upon unmasking the illusions and deceptions which man had thus imposed upon himself. His criterion of truth was absolute *subjective* clearness on all points —a view which had its roots in his intense and supersaturated egoism—and, this clearness reached, the courageous and honest adoption of the alternative presented as the upshot of such investigations. *Either-Or*, was his motto, the title of one of his most important works, and the name by which his unique figure was known even to the gamins in the streets of Copenhagen.

This same feature leads to an important characteristic of his general scheme of thought, which he has termed the *leap* or *saltus*—the cold plunge of resolution, the mental acrobatic feat which precedes all momentous decisions and which, in his view, marked even the growing action of nature. He knew nothing of evolution, and did not even permit its most natural and primitive intimations to affect his system. There was no continuity for him either in the natural or in the mental world—all went by breaches, ruptures, solutions of unity. He had absolutely no sense for the organic, nor even for the determinative aspects, of existence. Things *leapt* into existence, they became not. By such magic somersaults the world grew; by such its institutions were born, and by them man, too, was destined to carve out his salvation. In the same indeterministic fashion Christianity was catapulted into existence, and, having existed, illogically enough was foreordained to continue ever after as it originally was, unmodified by history or circumstances, and admitting of no compromise with the world or worldliness.

Kierkegaard's battle for the rehabilitation of primitive Christianity in its purest, rigidest, and most unadulterated form, was the crowning achievement of his life. It brought him into conflict with the ruling church, which he repudiated as a dishonest and hypocritical compromise with the worldly spirit of the times, and subjected him to not a little annoyance in the way of petty persecutions, which were rendered more easy by sundry grotesque features of his thought and personality. He was a standing figure in the comic journals of Copenhagen,—a distinction which he resented bitterly,—and having been once maliciously accused of a discrepancy in the longitude of his trousers' legs, gravely refuted the charge in his diary. But these were mere wrinkles on the anatomy of his greatness. His ideality, moral earnestness, his great literary power and puissant manliness, render him a gigantic figure in Denmark, and certainly one of uncommon stature in the race. For as a religious thinker, even by the world's standard, he will stand high, although as a philosopher his position is not so lofty; and it is not the least of Prof.

Harald Höffding's merits in this appreciation of his life to have pointed out frankly the obvious inconsistencies of his doctrines.

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Prof. Kurd Lasswitz, in his sketch of the life and work of Gustav Theodore Fechner, has attempted a critical *résumé* of the achievements of modern science in their bearing upon the ontological and cosmological problems of the world. He treats of motion and consciousness by the light of the new epistemological researches, and resolves the antinomies which they offer in an ingenious and masterly manner. His discussion of the significance of the threshold of perception as the criterion and distinctive characteristic separating the psychical from the physical is a skilful and creditable piece of analysis, but as it has been presented at considerable length in a recent number of *The Monist*, by the author himself, there is no need of our reverting to it here. The 111 pages of the work which are devoted to the delineation of Fechner's life show us the great psychologist as a student of medicine and disciple of the *Naturphilosophie*, a physicist who makes important researches in electricity and optics, and as a literary hack who is forced to earn his means of existing and of prosecuting his scientific researches by toilsome drudgery. They also tell us of his humorous writings, his ventures generally into literature, and of his four years of illness in middle life, when he was obliged to cease absolutely from all intellectual labor and from the least social intercourse with his family and the world. This period seems to have determined his bent for philosophy, which on his recovery he zealously pursued, giving to the world the works which contained the germs of all his views on the empsychosis of the universe and of so-called inorganic matter, and also of his doctrine of the parallelism of feeling and motion. His great work on *Psychophysics* appeared in 1860, in his fifty-ninth year, and the rest of his long life was devoted to the development and defence of the principles it established. Here falls his important work in analytic and experimental æsthetics, and finally we have the book in which he casts up his views of the world and of human destiny. His was a deeply religious nature, with a slight strain of mysticism, accounted for by his early philosophical environment, gentle, unassuming, and noble. He died in 1887 at the age of eighty-six, after having seen the science of which he was the principal founder attain undreamt-of breadth of development.

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The life of Thomas Hobbes, of Malmesbury, by Dr. Tönnies, remains to be noticed. It has been a work of love for its author, who has achieved an honorable reputation for his researches in the life and work of this great English thinker, and who has done as much as any contemporary writer to reinstate Hobbes in his true importance and fame. We have first a sketch of the life of the philosopher and of the genesis of his works, and then a discussion of his doctrines, his metaphysics, his logic, his mechanics, physics, anthropology and politics. In most of these departments Hobbes wrought permanent acquisitions to science which have been system-

atically obscured by posterity, although it can hardly be said that eminent vouchers of his philosophical importance have ever been wanting. Nevertheless, it will be well if interest in his work can be heightened and if we can trace to their true source there the beginnings of critical ideas which have dominated the two succeeding centuries. And to this effect Dr. Tönnies's little book will contribute much. McC.

HISTORY OF PRUSSIA UNDER FREDERIC THE GREAT. 1756–1757. By *Herbert Tuttle*, Late Professor in Cornell University. With a Biographical Sketch of the Author. By *Herbert B. Adams*. Boston and New York: Houghton, Mifflin, and Co. 1896. Pages, 159.

Prof. Herbert Tuttle, the greatest authority in Prussian history in the United States, and Professor at Cornell University, died in 1894, leaving his great work the *History of Prussia Under Frederic the Great* unfinished. Two volumes had appeared (1740–1745 and 1745–1756) and another was ready for publication (1756–1757), while the remainder was still in the shape of notes and references. Professor Tuttle's colleague and friend, Herbert B. Adams, was entrusted with the honor of editing the third volume, which now lies before us prepared with a biographical sketch of the lamented author.

Professor Tuttle was a born historian. He tells history by confining himself to the essential and introducing the incidental only where it is needed for a completion of the picture. He shows a keen appreciation of characters and is always just and fair in his judgment. He is more concise and at the same time less prejudiced than Carlyle, and his merits have been freely recognised by German scholars. Erdmanndörffer, the historian, and Gneist, the jurist, were full of praise when speaking of Professor Tuttle, who had become to the American nation a noble interpreter of German thought, and was equal in worth to Bayard Taylor, the famous translator of Goethe's Faust. The latter worked on different lines and in a different field, which was the literary Germany; yet the domain which Herbert Tuttle had selected as his life-work was not of less but rather of more importance. Tuttle stood in the midst of practical life. As the Berlin correspondent for the *London Daily News* and the *New York Tribune* he enjoyed great advantages, and his pleasant home in the Hohenzollernstrasse was a cosmopolitan centre of attraction for many prominent men of politics and science. Among the distinguished guests whom he received were Moltke, Helmholtz, the young Bismark, and others of similar prominence. His most noted American friends are President Angell of Ann Arbor and Andrew D. White of Ithaca. The former was his first teacher of history, and his spirit had deeply influenced and formed the methods of Herbert Tuttle; but it was the latter who encouraged him to follow the natural bent of his inclinations and suggested to him the project of aspiring for a university career.

Tuttle met, in Berlin, Miss Mary McArthur Thompson, a student of art and an occasional correspondent on art to the *International Gazette*. She was the daughter of Judge Thompson, of Hillsboro, Highland County, Ohio, and he mar-

ried her at her father's home July 6, 1875. She remained his faithful companion and coworker until his untimely death.

In speaking of Tuttle, the best expounder of the Prussian spirit, of Prussian heroism, and Prussian sense of duty, we ought to explain the greatness of this remarkable people and the dynasty that at last succeeded in resuscitating the old German empire and making the German name respected not only in the realm of literature and science but also in the world of politics. But we could not do it better than it has been done by Professor Tuttle himself, and since the subject is not only of interest but also of importance, we shall not begrudge him the space for it in this review of his posthumous work but quote it in full. It is a lesson that our American youths should well remember. It was at a banquet given by Americans on a Fourth of July at Berlin that Mr. Tuttle was called upon to respond to a toast "Americans in Europe," where among other striking remarks he spoke the following noteworthy words:

"We are content to learn without teaching, to observe without reforming; and "in this sense I shall ask leave to address for a moment that class of students, old "and young, who earnestly seek to profit by the study of the social and political "institutions of Europe. Holding myself the most needy of them all, what I have "to say will be only in the form of suggestion. The first valuable lesson which "the thoughtful American learns here in Berlin, for instance, is, in my opinion, to "take off his hat when the Emperor drives along the street. I say this with all "earnestness, for beneath the practice lies one of the profoundest moral truths in "the economy of social life. To say that it is a mere act of servility to a reigning "prince, or a recognition of the monarchical principle, is as unjust as it would be "to accuse me of reading this company a paltry lesson in etiquette. No, in this "act of respect to the head of the State we simply recognise the majesty of the "State itself. We do homage to that long series of brave monarchs, to that com-"bination of valor, sagacity, and patience which expanded the little mark of Bran-"denburg, almost hiding in the swamps from the savage Wends, into the fair pro-"portions of the Prussian State and the mighty system of the German Empire. "We are really in the presence of the immortal heroes of Fehrbellin, of Rosbach, "of Sadowa, of Gravelotte, and of a hundred other victorious battlefields. We are "uncovered before the Protestant Reformation, to which Prussia and Germany "owe so much. And, sir, when we cross the ocean and confront a different form "of government, this eternal truth still asserts itself, or ought to assert itself, "through all the violence and passion of party conflicts. It is not simply the spirit "of this day, it is not the publicity of this occasion, but obedience to an earnest "conviction of political duty, which leads me not only to echo your own eulogies "upon the first magistrate of the Republic, but to endow him in fancy with all the "virtues of Washington, and Jefferson, and Adams, and Lincoln. By this means "we exalt our conception of the office, we exalt the office itself. But the base par-"tisan spirit of detraction, the impudent and obtrusive familiarity, the utter want

"of courtesy to the man for the sake of the high office, from which not even the "American President is spared, is more than bad taste, more than a display of ill-"breeding,—it is demoralising and dangerous. And the man who, in the press, "or on the platform, or anywhere, fails in that delicate and noble consideration, "seems to me to want one of the first qualities of the perfect citizen. He is false "to his own better nature, and disrespectful to the long series of names which have "rendered illustrious the annals of that great office. Presidents come and go,—"some of them come too soon and go too late,—but they are all links in that glori-"ous succession which for a century makes up the historical harmony of the State. "Therefore I plead, Mr. Chairman, for all those trifling courtesies, for all those "delicate social observances, which lend dignity to any political system, and exalt "the conditions of all public life.

"If time permitted, I might call the attention of American students to other ob-"jects worthy their careful notice in Europe. I might mention that recognition of "the omnipotence of law which, even among so orderly a people as ours, is not "invariably felt in a broad, general, abstract sense. I might set over against the "energy and restlessness of American life the element of æsthetic repose, which is "an important condition of all great achievements in science, or art, or literature. "But these can only be suggested, and others must be wholly omitted.

"In conclusion, Mr. Chairman, you will permit me, almost a veteran as it "were of our little colony here, to pay a slight tribute to the young men whom "during a term of four years I have seen come and go. I have known them and "watched them carefully. I have observed their lofty scholastic zeal; I have "learned to know their high conscientious purpose; and as their countryman I can "say from the bottom of my heart that I am proud of them. They are not indif-"ferent students; they are not superficial observers; and I am convinced that in "their chosen professions, whether medicine, law, theology, or political science, "they will carry back the best results of foreign study, and a broader equipment "for the duties of the American citizen."

This is the spirit in which our young men should go abroad, and if they apply Professor Tuttle's lesson, they will on their return to America be a blessing to their own country and serve as channels through which the greatness of the Old World may flow over into the national life of the New World without adding here to the cramping conditions which there form a hindrance to a freer and higher development.

P. C.

ERKENNTNISTHEORETISCHE GRUNDZÜGE DER NATURWISSENSCHAFTEN UND IHRE BEZIEHUNGEN ZUM GEISTESLEBEN DER GEGENWART. Allgemein Wissenschaftliche Vorträge. By *Dr. P. Volkmann*, Professor an der Universität Königsberg i. Pr. Leipsic: B. G. Teubner. 1896. Pages, 181. Price, 6 Marks.

Professor Volkmann is a physicist by profession whom the waxing interest now centring about the philosophical problems of science, has moved to a daring plunge

into the "rude imperious surge" of epistemology. There is much in his book to commend, particularly its humanistic and popular spirit, as also the exalted educational objects which it sets. On this, and related excellences, there can be but one opinion. The interest of the philosophical student, however, lies in a different direction,—narrower, and in a measure more ungenerous, but technically of paramount importance,—an interest that concerns the independent and original contribution which the book ostensibly makes to science; and on this point there is ground for difference.

Perhaps owing to the popular form in which his thoughts are cast, Professor Volkmann's expositions have not the rigor and impressiveness which intrinsically belong to them; but antecedently we should be inclined to think to the contrary. The simple forms of the mathematical and physical sciences best lend themselves to the considerations with which epistemology is concerned, and it is precisely the simplest of these simple forms in connexion with which the elements of this discipline ought to be most satisfactorily developed. The success which the scientific predecessors of Professor Volkmann have achieved in this department is almost exclusively due to the fact that they have set out from just these branches of inquiry.

The volume is made up partly of a number of popular articles which originally appeared in *Himmel und Erde*, and partly of a series of popular lectures delivered in Königsberg. They discuss broadly the relations of the sciences and philosophy, the historical attitudes of mankind to knowledge, the characteristic features and tendencies of the main branches of scientific and humanistic research, the distinctive methods of scientific investigation, the wonderful acquisitions which have been its upshot, and lastly but not least, the bearings of all this momentous work upon methods of research in sociology and upon practical educational and intellectual problems. All this, as a matter of reproductive exposition, has been done clearly and intelligibly, in a manner commensurate with the author's accredited competency, and not infrequently with the added ornament of really elucidating the points at issue. What criticisms we have to make, apply solely to the principles which the author has advanced with polite but evident pretensions to power and novelty as epistemological aids, and which he regards as his unique and valuable contribution to the subject. These are the principles of Isolation and Superposition, which we may now briefly examine.

Nature bears, to all appearances, a predominantly composite character, which in cognition must be resolved into its constituent or determinative elements. These elements are then again combined to reobtain the phenomena of nature according to the varied exigencies of life and thought. Ordinarily these processes are styled abstraction and combination, analysis and synthesis, separation and composition, but Professor Volkmann prefers to call them *isolation* and *superposition*—designations which in his judgment carry meanings not conveyed by the traditional terms.

Superposition has a well-defined signification in elementary geometry, as a method of demonstrating congruency, and in physics as the method of adding vectors. It is only in this last meaning that it has any analogy with the proposed usage of Professor Volkmann, saving, perhaps, its etymology. It is possible that being "foreign words" in German, both these terms have a more technical clang in that language, and offer a seemingly richer field of prospective association than they do in English, where their use is common. This is an important consideration in the choice of new designations, as is evidenced by the formation of scientific terminology, and by the sorry figure which sometimes quite excellent appellations of new principles in one language cut when translated into another. Or again, they may be viewed as catch-words. Catch-words, even where they do not embody new ideas, may greatly elucidate the mechanism of research, if they are at all happy or even passably rich in associations, since this last attribute, as involving the principle of comparison, is really at the root of explanation. But either of these implied criteria a new term must satisfy. It must either have a rich connotation or admit of such being supplied. And neither of these demands do Professor Volkmann's innovations seem to satisfy, at least in a sufficient manner to justify the ousting of the old terms.

Do they offer then anything new on the side of their contents? We think not. Professor Volkmann's isolation is simply abstraction, and we gain nothing by saying we *isolate* the qualities and effects of nature rather than *abstract* them, any more than we should by saying that we *separate* or *extricate* them. The legitimate function of these terms is that of synonyms or helps in defining a fundamental operation. Similarly, we gain nothing by saying the *superposition* of forces rather than the *composition* of forces, nor by speaking of the superposition of effects generally rather than of their apparent *complexity* or *mingled action*, which in nature itself and objectively is *one* and only requires analysis because of the needs of *our* comprehension. Thus, a given force may be always viewed as the resultant of an indefinite number of other forces, indefinitely directed. But in the system of nature itself such a superposition of forces can scarcely be said to have *actual* significance, be its intellectual and practical justification what it may.

Professor Volkmann lays no stress on superposition as a principle of nature, however, but emphasises it solely as a principle of epistemology, having its prototype in the composition of forces. Yet what it elucidates here more than the present conception of the phenomena elucidates is also difficult to see. That the forces act *independently* of one another, or as if they produced their effects successively and separately, must be discovered and stated in both cases; and when that has been done there is nothing left. It is then just as clear to say that they are *compounded* as that they are *superposed*. The same is true of the other examples adduced (p. 76 et seq.); their character is apparent from their mere statement. And as to the extended application of the principles, to the concepts of abstract and concrete, theory and practice, school and life, being and thinking, etc., these too

must be pronounced unfortunate, since they can only be regarded as metaphorical extensions of the same idea, obvious enough, but withal considerably strained.

For example, since *abstract* and *concrete* are synonymous respectively with *centre of isolation* and *superpositum*, and forasmuch as a natural law is an *abstractum*, centre of isolation, or *isolatum*, therefore we can never logically expect that there should exist a law comprehending and explaining the *entirety* of nature, for the reason that nature is a concretum or, *novo termino*, a superpositum—wherewith a dangerous but popular metaphysical error is refuted.

The conclusion is undeniable. Yet it might be just as well to risk the chances of being misunderstood by merely saying that a thing which is a knowledge of a *part* cannot logically be a knowledge of a *whole* consisting of dissimilar parts. As an instance of the power of the new view the example is not felicitous.

There is no gainsaying but Professor Volkmann by long dwelling upon his ideas of isolation and superposition—through the associations naturally formed—has found them of inestimable value in his personal efforts at orientation; but we opine that their natural sphere of usefulness ceases at this point. In denying to them absolute validity, we must bear in mind his prefatory disavowal of such a qualification for all epistemological norms, and his position that we are in search here of advantageous points of view only. But have they a wide validity even as such? Are they not an encumberment of our epistemological machinery, which is pretty heavy as it is? A supererogation? In our judgment they merely elaborate the fact that the processes of analysis and synthesis have always been, and are still, widely used in thinking.

We have no occasion to remark upon Professor Volkmann's strictures of Monism, as he identifies its doctrine absolutely with the principles advanced by Haeckel; their falling wide of the mark here is not our concern. Nor are our own animadversions to be conceived as derogatory to the general merits of Professor Volkmann's book,—merits which we believe are solid and which we have sufficiently emphasised above. T. J. McC.

GRUNDRISS EINER GESCHICHTE DER NATURWISSENSCHAFTEN, ZUGLEICH EINE EINFÜHRUNG IN DAS STUDIUM DER NATURWISSENSCHAFTLICHEN LITTERATUR. Von *Dr. Friedrich Dannemann.* I. Band: erläuterte Abschnitte aus den Werken hervorragender Naturforscher. Mit 44 Abbildungen in Wiedergabe nach den Originalwerken. Leipsic: Wilhelm Engelmann. 1896. Pages, 375. Price, M. 6.

The closing years of the nineteenth century have been pre-eminently years of reflexion and retrospect. In the fever and haste of acquisition which followed upon the astounding revelations of the two first and classical centuries of scientific inquiry, ours had little time or composure for reverting to the works of the masters either for criticism or for stimulus. For the first the need did not as yet exist, and as for the second, perhaps, the quelling sources had not yet run dry. But with the

increase of the body of knowledge and the infinitely ramifying extension of its details, the necessity of keeping handbooks and treatises up to date, all of which led to reproductions of reproductions in untold measure, humanity got farther and farther away from its original inspiration in certain departments—much to the detriment of critical inquiry, but more so to that of instruction. Thus, even in the first decade of this century we find an eminent mathematician complaining that Newton, the Bernoullis, and even Euler were not read, and ascribing certain grave aberrations in his science to their neglect. Thomson & Tait's effort to re-establish the hegemony of Newton's dynamical ideas is known to all.

The reaction first and naturally set in in connexion with the historical sciences, philosophy, Biblical research, literature, etc., and although it was long before its quickening effect was felt in science, the vigor with which it is now taking possession of this field, has made amends for its tardiness. Its visible expression is the vast number of recent books by scientists on the theory of knowledge, histories of special sciences and groups of sciences, the humanistic and organic character which instruction is taking on, and lastly but most important of all, and having an intimate connexion with the foregoing, the publication of series of Scientific Classics, from which students may draw their inspiration undefiled. The best known of these are the series of Dr. Ostwald, published by W. Engelmann of Leipsic, and the fac-simile reprints of epoch-making works issued by Mayer & Müller of Berlin. We may have occasion to mention these in detail later.

The most recent testimony of the power, beauty, and utility of the new idea, as a means of quickening instruction, is the book by Dr. Dannemann now under notice. Dr. Dannemann's work is designed to be an elementary history of the natural sciences, wherein the accounts of the great monumental discoveries of science shall be given in the original words of their first promulgators. The powerful stimulus which such a book offers cannot be overrated. It is intended primarily for students in high schools, polytechnical schools, colleges, etc., but is so delightful and unique in character, and supplies so gaping a want in the literature of instruction and of autodidactic reading that there is no lover of scientific culture, nor even of genuine classical culture, but could wish its pages might be ardently dwelt upon and absorbed by every man and woman. It is no exaggeration to place upon it a religious valuation. The day is not many centuries distant when such a book, compiled perhaps on slightly different lines, will take its place in our home-libraries by the side of *The Imitation* or the *Mahâparinibbâna Sutta*.

The idea of using for purposes of instruction classical researches of the great masters of science is not a new one, having been proposed a long time ago by Professor Mach of Vienna as being psychologically and æsthetically far better qualified for imparting the genius of science than the systematic but dry study of skeleton compendiums. Professor Mach's plan aimed at positive, typical instruction in science for students not intending to pursue a professional scientific career, and would have embraced only a few but relatively complete researches. Dr. Dannemann's

idea is slightly different. His selections comprehend nearly *all* departments of inquiry and constitute, so to speak, an anthology of science. The book may be compared to the *Quellenkunde* of historical students, although it is both more and less than a book of sources in giving specimen passages and in not giving full bibliographies.[1] We can convey no more vivid idea of the beautiful and useful character of the work, nor bestow upon it higher praise than by enumerating a list of the passages reproduced, each of which is preceded by a brief biography and characterisation of its author.

There are 62 in all. The first four are from the *Zoölogy* of Aristotle, from the mechanical and mathematical works of Archimedes, and from Pliny's *résumé* of the scientific knowledge of antiquity. The fifth is from Copernicus, enunciating the heliocentric system. The sixth, seventh, and eighth are from Galileo: (1) on the Copernican doctrine, (2) on falling bodies, and (3) on the discovery of the moons of Jupiter and the rings of Saturn. The ninth is Gilbert on the magnet, the tenth Kepler on comets. The eleventh is on Bacon as the promulgator of the inductive method of inquiry.

Next come Pascal and Périer on barometer-heights, Guericke on the air-pump, Newton on sunlight and the law of gravitation, Huyghens on the undulatory character of light, Mariotte on the atmosphere, Swammerdam on bees, Hales on the physiology of plants, Celsius on the thermometer, Kant and Laplace on the origin of the universe, Chladni on meteors, Euler on the undulatory theory, Aepinus on electricity, and Franklin on the lightning-rod Scheele's discovery of nitrogen, Lavoisier and Laplace on combustion and on heat, Galvani on electricity, and selections from Goethe's *Metamorphosis of Plants*, follow. Then we have Sprengel on the fertilisation of flowers, Saussure's chemical researches on vegetation, Blumenbach on anthropology, Cuvier's enunciation of his "natural system," Dalton's atomic hypothesis, Berzelius on the fixed proportions of atoms, Gay-Lussac on the law of volvolumes, and on iodine, Davy on potassium and sodium, Cuvier on catastrophes, Lyell on geology, Wöhler on aluminium, and Oersted on the magnetic needle as affected by the electric current. Afterwards come extracts from Faraday's *Experimental Researches*, Talbot's invention of photography, Johannes Müller on the sense of sight, Schwann on the cells of organisms, and Schleiden's refutation of the assumption of vital force. The last are Liebig on vegetable nutrition, Unger on the transition from the vegetable to the animal world, Darwin on the formation of coral islands, Bessel's first measurement of the distance of a fixed star, Carnot on the theory of the steam engine, Mayer on the conservation of energy, Schönbein on ozone, Schrötter on red phosphorus, Pasteur on micro-organisms, Kirchhoff and Bunsen on spectrum analysis, and, lastly, Alexander von Humboldt's *résumé* of the state of natural knowledge in the year 1845.

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[1] A second volume is promised, portraying the connexions of the sciences whose results are here exhibited.

From this list no one can withhold his admiration. Additional selections might be suggested, but none could well be omitted.

In commending the book of Dr. Dannemann, we could do the student no greater service than to recommend for his collateral perusal Carus Sterne's *Allgemeine Weltanschauung in ihrer historichen Entwickelung* (Stuttgart: Otto Weisert), which depicts in rapid and brilliant strokes the connected development of that body of knowledge of which Dr. Dannemann offers the living documents.

T. J. McCormack

Die Grassmann'sche Ausdehnungslehre. Ein Beitrag zur Geschichte der Mathematik in den letzten fünfzig Jahren. Von *Dr. V. Schlegel*, Professor an der Gewerbeschule in Hagen. Leipsic: B. G. Teubner. 1896. Pages, 44.

Grassmann's ideas have been widely studied in America, and much non-professional curiosity has been aroused with regard to them. The present contribution by Dr. V. Schlegel to the history of the great work embodying them will therefore be a welcome help to all who desire a closer knowledge of the externalities of the subject,—to mathematicians as a bibliographical survey, and to laymen as characterising the significance of the movement. Dr. Schlegel was a teacher at Stettin and a younger colleague of Grassmann during the latter years of the great mathematician's life, and has since devoted most of the time which he could spare from his professional labors to the enthusiastic research of Grassmann's achievements. The present brochure, which has been wisely printed in separate form, so as to be accessible to students, is a brief and accurate history of the *Ausdehnungslehre* and of its broadly ramified relationships with other branches of mathematics. The useful bibliography which is appended contains more than one hundred and eighty titles, while that indispensable adjunct, an index of names, is not missing. *μ.*

Introduction to Sociology. By *Arthur Fairbanks*. New York: Imported by Charles Scribner's Sons. 1896. Pages, xv, 274. Price, $2.00.

The Principles of Sociology. An Analysis of the Phenomena of Association and of Social Organisation. By *Franklin Henry Giddings, M. A.* Professor of Sociology in Columbia University in the City of New York. New York: Macmillan and Co. 1896. Pages, xvi, 476. Price, $3.00.

There are so many minds now engaged in studying the laws which govern the problems presented by society, it is not surprising that these two works should appear about the same time, although that of Professor Giddings had a short precedence. Necessarily they go over much the same ground, and for this reason, as well as owing to certain contrasts they present, they may with propriety be reviewed together. It is true that Professor Fairbanks does not claim to have given even a systematic outline of the principles of Sociology. He admits, moreover, his obligations to Professor Giddings's earlier writings, although the *Principles of Sociology* reached him only after his own work was in type. But it is for others to judge of

the merits of his contribution to the science of which he treats, and they cannot be pointed out better than by a comparison of his views with those enounced in Professor Giddings's more ambitious work. This claims to have placed sociology on a true basis, by referring association and social organisation to the "consciousness of kind" which marks off the animate from the inanimate, and by treating it consequently as a psychological instead of a biological science.

In a few paragraphs, on nearly the last page of his book, Professor Giddings puts and answers the question whether society is an organism. He regards this as the final question for the student, and thus unconsciously provides a test by which to judge of the merits of his book, if not of its theory. His conclusion is that a society is "as much higher and more complex than an organism as an organism is higher and more complex than inorganic matter." It is an *organisation* the function of which is "the evolution of personality through ever higher stages until it attains to the ideal that we name humanity." This function must be always active, and thus we are told, that "at every step the sociological task is the double one,—to know how social relations are evolved, and how they react on the development of personality." But how can the task be properly performed unless we have a general idea of the nature of the existence under consideration? In reality this is assumed, and as the whole question is as to the character of the laws which govern its activity and the results of their operation, it is advisable, if not essential, to begin the study of society by obtaining as clear an idea as possible of its general nature.

The importance of this point is recognised by Professor Fairbanks, who begins the first chapter of his book by the statement, that "the first work of the student of sociology is to form a general conception of the nature of a society or social group, that object which he proposes to study." The question here implied is answered by allowing to society the organic character, without admitting it to be actually an organism. The organic character of a society is denoted by its unity, combined with remarkable complexity of structure, which unity and the development of the society are determined from within. The real unity is dynamic, and therefore consists, "not in the structure, but in the one process in which all the parts depend intimately on each other." Professor Giddings, on the other hand, speaks of society as an *organisation*, by which he means "a complex of psychical relations," having a physical basis. Thus, it evidently possesses an organic character, and like an organism, "it may exhibit every phase of evolution—of differentiation with increasing cohesion or unity." Though Professor Giddings concludes that a society is much higher and more complex than an organism, yet he affirms that the analogy sought to be established by Mr. Spencer between the social constitution and the constitution of a "biotic organism" is real, while at the same time the former possesses features that are distinctive.

Thus, although the individual is the simplest unit of society, he is naturally a social being. It is true that, as Professor Fairbanks suggests, man was not orig-

inally a gregarious animal "of choice." But he had no volition in the matter. His nature required him to be social. The feeling in which the "attractive forces" of society are based is an essential feature of human character. It exhibited its action in the first union of man and woman, and it was intensified when the enlarged unit of society, the family, was completed by the birth of the first child. In the fundamental position assigned by Professor Fairbanks to the attractive forces in the formation of society we have one of the most important features of his work. Professor Giddings refers to the development of sympathies, but these are due, according to his theory, to the educational influence of association, which results in "a feeling of pleasure in the mere presence of a fellow creature." It is evident that this feeling is different from *the consciousness of kind* which he postulates as "the original and elementary subjective fact in society," and which he explains as "a state of consciousness in which any being, whether low or high in the scale of life, recognises another conscious being as of like kind with itself." Consciousness of kind he believes to be "co-extensive with potential society and with nothing else," and therefore fulfils the sociological requirement. But mere consciousness of kind may exist under conditions which preclude the formation of social groups, and it would be useless for this purpose in the absence of the feeling of pleasure in the mere presence of a fellow creature, which Professor Giddings refers to as one of the creations of association, but which, rather than simple consciousness of kind, we should consider to be the fundamental fact.

Conflict occupies an important position in Professor Giddings's theory, and he regards it as unnecessary to prove that "social intercourse is a mode of conflict." And yet, although a clash of atoms or of thoughts may be necessary to progress, without some other process there would be no positive results. Attraction as well as repulsion is necessary to a perfect vibration, and if social intercourse is nothing but a mode of conflict society proper would never have existed. Society is an organic unity, and that which forms its actual basis, the family, is an expression, not of conflict, but of the attractive forces which Professor Fairbanks properly regards as part of the psychical character of individuals, and which constitute the real social bonds. The family is thus naturally regarded as a social unit, and to Professor Giddings it is, indeed, *the* social unit, although, according to him, the family is not properly a society unless it includes adopted members. But we would suggest, that if the actual primordial family consisted, as there are reasons for believing, of a woman and her children, that is, the simplest group of blood-relations, then the father of the children may be considered as an adopted member of the family, which, as thus augmented, becomes a true social group.

The actual value of the association of man and woman in primitive communities is not developed in either of the works under review. It is recognised, although not fully, by Professor Fairbanks when treating of the beginning of separate economic functions. He gives the first place, as a source of separation, to the difference between the strong and the skilled, and the second place to the difference be-

tween the sexes. In relation to the latter, he says, "the general line of division was between the outer world, and the inner world of the family which began to be formed. To the man fell the duties of protection from attacks of man and beast, and the procuring of game for food. The work of the home, such as the preparation of food, the manufacture of garments, care for the children, the provision of whatever man may need or desire, this was commonly the woman's lot. This source of differentiation was no less important than the preceding, in providing the basis for a higher type of social organisation." It was more so, as society is the co-ordinated expression of the internal and external activities represented by the two sexes. Woman stands for the attractive forces which form the cement of society in all stages of its development, and man for the repelling forces which govern the external relations of primitive societies, and which are referred to by the term "conflict." The former are represented by the gens, which originally consisted of the descendants of a common female ancestor, and the latter by the tribe. Professor Fairbanks says little as to the origin of these social groups, but the subject is dealt with fully by Professor Giddings, who follows in the lines of his predecessors. A little more originality would have been advisable, as the views of Dr. J. F. M'Lennan and other early writers are open to considerable criticism, as the present writer has shown in his work on *The Development of Marriage and Kinship*. The hordes about which Professor Giddings has much to say, are probably only portions of disintegrated tribes. The existing cases he refers to are of no value for the purposes of his argument, especially as he has fallen into an error in classing among them the aboriginal Australian social groups. As shown by Mr. A. W. Howitt, the native Australians have a perfect tribal organisation, and what Professor Giddings treats as a horde is really a tribe consisting of several totemic groups. Otherwise his explanation of the historical evolution of society is very good. It is considered under the heads of Zoögenic Association, Anthropogenic Association, Ethnogenic Association, and Demogenic Association. Professor Fairbanks deals with the subject of association much less fully. His mode of treatment, however, requires him to give special prominence to particular topics, and hence he has separate chapters on "The Industrial Organisation of Society" and "The State as an Organ of Social Activity." In the latter he refers to the tendencies of the modern state to interfere with economic activities and to become the employer of labor in numerous forms of industry, without passing any judgment on this debatable subject.

We are pleased to see that in both the works under review the "Social Mind," which is the General Mind of G. H. Lewes under another name, is considered deserving of treatment in a separate chapter. Both writers regard it as existing only in individual minds, although it is more than any individual mind. Professor Fairbanks is particularly happy in his dealing with the relations of the individual to society. He speaks of the person as "the concrete expression of the group life," though progress proceeds from individuals, whose personality is the "true and ad-

equate expression" of the psychical life of the past and of the present; which agrees with Professor Giddings's conclusion that the function of social organisation is the evolution of personality. The work of Professor Fairbanks has two chapters on the influence of natural selection in human society, where it insures the survival of the fittest individuals, the fittest groups, and the fittest institutions. Struggle is raised to the psychical plane, and its aim is supremacy instead of destruction. To Professor Giddings also society is a psychical phenomenon, but physical energy is the source of all its activity and equilibration of energy the cause of all its changes, social progress being thus a phase of physical evolution under the influence of the psychical factor. The relation of psychology to sociology is a practical question of great moment, and Professor Giddings's view of it is seen in the statement, that "psychology is the science of the association of ideas. Sociology is the science of the association of minds." But as psychology is concerned with "the genesis and with the combinations of the elements of mind," it is rather the science of the association of states of consciousness than of ideas. Professor Fairchild's opinion is that the individual mind does not exist until it is developed in society. So that psychology has to deal with man in society, and sociology with "the psychical life which arises when men enter into organic union." Thus, "the subject of the two sciences is the same, and the difference between them is simply a difference of standpoint." We would suggest that the principles are the same in each, but that one is concerned with the individual mind and the other with the general or social mind.

There are various other matters dealt with by these two works which might be referred to, but we will content ourselves with saying generally that, notwithstanding the criticisms we have felt bound to make, they are both deserving of much commendation. In a sense they may be regarded as complementary to one another each supplying the other's deficiencies. If the student reads first Professor Fairbanks's "Introduction to Sociology" and then the "Principles" of Professor Giddings, which we should state has an excellent index, he will obtain a very fair knowledge of the nature, scope, and aim of sociology. C. STANILAND WAKE.

SCHOPENHAUER'S SYSTEM IN ITS PHILOSOPHICAL SIGNIFICANCE. By *William Caldwell, M. A., D. Sc.* New York: Imported by Charles Scribner's Sons. 1896. Pages, 538. Price, $3.00 net.

That the interest in the philosophy and personality of Schopenhauer continues unabated is evidenced by the respectable number of contributions which yearly make their appearance, expounding, criticising, or developing his views. One of the latest of these is by William Caldwell, Professor of Moral and Social Philosophy in the Northwestern University at Evanston, and formerly of the universities of Edinburgh and St. Andrews. Professor Caldwell's book, which is rather a portly volume, but bears withal the marks of profound scholarship and thorough philosophical culture, is not a didactic exposition of Schopenhauer's philosophy de-

signed to initiate the reader into the primary elements of the latter's system, but an attempt "to suggest the significance of Schopenhauer's thought as an organic work." The author has tried to connect Schopenhauer "with some few broad lines of philosophical and general thought—with some few broad principles of human nature." The selection of Schopenhauer as the theme most distinctly adapted to exhibiting the bent and upshot of modern thought, is explained by the fact that Professor Caldwell regards him, with Von Hartmann, as representing together one-half of modern philosophy. Von Hartmann Professor Caldwell hopes to be able to treat in a subsequent volume.

The present work is divided into ten chapters. The first considers Schopenhauer's significance. The second and third, which treat of his idealism and his theory of knowledge, attempt to dig down to the theoretical roots of his philosophy. The fourth chapter is concerned with the "bondage of life," from which art and ethics and religion are supposed to set us free. Chapters V., VI., VII., and VIII. present Schopenhauer's philosophy of art, his moral philosophy, and his philosophy of religion, by which he is mainly known to the general public of to-day. Chapter IX. treats of his "Metaphysic," and is designed to exhibit the fundamental character of his thought as a whole. The last chapter essays a positive statement of his system. In this and the "Epilogue" the author suggests points "which might form the material for further study and exposition."

Having stated the contents, we shall now notice some of the conclusions which Professor Caldwell has reached, omitting critical comment.

"It is the service of Schopenhauer," says Professor Caldwell, "to have re-"versed the whole process of German philosophy, and to have looked at man from "the side of irrational action and passion, things to which Kant's ethics and He-"gel's system had done scant justice. He really wrote about the 'natural man' for "'all time,' saying, perhaps, the last word on that subject in philosophy."

We should naturally be tempted to regard this reversion as a degeneration, but far from being a retrograde philosopher, Schopenhauer is a direct successor of Kant, "although, perhaps, on an opposite line to that of Hegel." Practically, Schopenhauer took his stand upon science, but he placed limitations upon its potency as a speculative instrument. Besides his unsystematic methods slightly offset his advantage in this respect; as Goethe was a *Gelegenheitsdichter*, so Schopenhauer was a *Gelegenheitsphilosoph*, making "little serious attempt to correlate his own thought with any other system in existence save, perhaps the Kantian philosophy."

Though "Schopenhauer's system has a strong materialistic coloring, it is not "materialism. It is rather animalism or panpsychism. His theory of life is essen-"tially metaphysical; living beings are individuations of the will to live, the prin-"ciples of individuations being space and time." He accepted the Berkeley-Kantian analysis of reality, which, of course, excluded the slightest suspicion of materialistic leanings. Virtually he contends "for a new kind of idealism about reality, a dynamic idealism in which the reality of all things is determined by the

function and purpose they discharge in the cosmic process." He maintained that the world is will, and will means for him force or impulse; "but," says Professor Caldwell, "he still conceives of will in primarily a negative way. He comes in the end to tell us what the world *is not*, and what the end of life *is not*." We may detect here the germ of his Buddhistic and pessimistic predilections.

The result is a sort of illusionism, which Schopenhauer essays to escape from by his peculiar treatment of the religious problem. "In its highest reaches," says Professor Caldwell, "Schopenhauer's philosophy becomes virtually a metaphysic "of the redemption of the individual from his own misery and from that of the "world. . . . His treatment of religion is important. It is essentially different from "that of Kant and from rationalism generally, laying far more stress on the pecu-"liarly religious feelings as elements in the solution of the religious problem."

It is no adequate characterisation of Schopenhauer's philosophy, Professor Caldwell thinks, to call it pessimism. "Schopenhauer himself attached quite as much importance to the positive aspects of his system as to the negative." His success among the degenerates is owing to the circumstance that "it is naturally com-"forting at times to be able to put one's self in the hands of a man who had the "strength to assault all intellectual presuppositions and theories about life whatso-"ever, and, in particular, to help to overturn a philosophy whose proudest boast "it was to exhibit the intellect or the idea as actually victorious over both nature "and history." His success generally is due to the fact that his philosophy chronilces "the effort a century has had to make to reconcile its ideal theories about life with the facts that science has disclosed or thinks it has discovered."

Lastly, Professor Caldwell emphasises Schopenhauer's contempt for dogma and history, which incapacitated him from understanding and justly appreciating even his own mission, which was to "correlate idealism and realism, Platonism and life." Therein, according to Professor Caldwell, lay his real work, of which, however, strange to say, he was absolutely unconscious. As to his influence, "he "appealed to those who were without any gospel, to those who felt that the will "was at the bottom of everything, but who yet could not feel that they had been "wrong in believing something else to be at the bottom of everything. The re-"deeming thing about him and those who began to listen to his teaching was that "both he and they had got hold of a fact greater, perhaps, than they could reckon "with, but still a fact."

From the preceding statements we may, perhaps, also gather some inkling of Professor Caldwell's own views. T. J. McC.

GRUNDRISS DER GESCHICHTE DER PHILOSOPHIE, ZUM SELBSTSTUDIUM UND FÜR VORLESUNGEN. Von *Dr. Johannes Rehmke*, o. ö. Professor der Philosophie zu Greifswald. Berlin: Carl Duncker. 1896. Pages, 308.

The literature of Germany is extraordinarily rich in histories of philosophy, and their number seems to be steadily on the increase. The last to enter the field is

Dr. Johannes Rehmke, Professor of Philosophy in Greifswald, who has now enriched the growing cycle of his works by the present business-like and concise *Rudiments*, designed for autodidactic purposes or for collateral use with lectures. Its succinct form, utterly eschewing comments and discussions, its banishment of all biographical details, the omission of unnecessary prefaces and introductions, are all qualities which unite in making it unique and valuable and deserving of recommendation for students whose interest is not in need of being aroused. So far as we have been able to examine it, it is a faithful miniature reproduction of its material, devoting to each thinker adequate space, measured by his relative importance in the development of philosophy.

Professor Rehmke characterises the object of philosophy to be the defining of reality, full and entire, in terms of its general controlling factors; hence its designation of universal or fundamental science. Its expressed function is the answering of all general questions touching the world or reality in its largest sense.

Excluding India and all tentative and groping speculation (we cannot infer from the author's statements whether he places the philosophy of India on the same level with primitive and unsystematic attempts at solving the problems of existence), he makes philosophy begin with the Greeks. The development of philosophy is divided into two main parts—the history of ancient, and the history of modern philosophy: the first comprising the time from 600 B. C. to 1600 A. D.; the latter embracing the period from 1600 A. D. to the present. To the ancient period 101 pages are devoted, and to the modern 203. The entire era of the rise of Grecian philosophy, extending from the Ionic physiologers through the Pythagoreans, Heracliteans, Eleatics, Empedocles, Anaxagoras, and the Atomicians to the Sophists, receives but 23 pages. The commanding figures of ancient philosophy, Socrates, Plato, and Aristotle, receive 38. The decline of ancient philosophy, which is made to extend from the Peripatetics, Epicureans, Stoics, etc. to Scholasticism, Western Mysticism, and the philosophical Humanists of the sixteenth century, receives 39 pages. Modern philosophy is divided into three periods, the Pre-Kantian, the Kantian, and the Post-Kantian. In the first, Bacon (3 pages), Hobbes (8 pages), Descartes (14 pages), Geulinx, Malebranche, Spinoza (18 pages), Locke (11 pages), Berkeley (7 pages), Hume (16 pages), the Scottish School, the philosophers of the French Illumination, Leibnitz (17 pages), Wolff, and the philosophers of the German *Aufklärung*, receive consideration. To Kant, *forty-six* pages are devoted. After Kant are treated Fichte (11 pages), Schelling (3 pages), Hegel (5 pages), Schleiermacher, Schopenhauer (8 pages), Herbart (6 pages), and Lotze (3 pages). Lotze concludes the work. A glance at the preceding list and the figures showing the space devoted to the respective philosophers, will indicate the scope and predilections of Professor Rehmke's treatment. Its economic qualities alone might justify its translation into English, provided this could be fluently and not woodenly done. *μ.*

DE PLATONICIS MYTHIS. Thesim Facultati Litterarum Parisiensi. Proponebat *Ludovicus Couturat*. Paris: Felix Alcan. 1896. Pages, 119.

SUR UNE NOUVELLE MÉTHODE POUR DÉTERMINER LA CHRONOLOGIE DES DIALOGUES DE PLATON. Mémoire lu le 16 Mai, 1896, à l'Institut de France, devant L'Académie des Sciences Morales et Politiques. By *W. Lutoslawski*. Paris: H. Welter. 1896. Pages, 34. Price, 2 Fr.

The work of M. Louis Couturat forms a thesis presented to the Faculty of Letters at Paris. In examining the contradictions of the traditional conception of the Platonic doctrines, which students of the subject have left unexplained, the author has noted that the majority of the difficulties spring from the comparison of texts embodying mythical views with purely didactic passages of the Dialogues, and that consequently a criticism of the Platonic myths should precede every expressed interpretation of Plato's doctrines. Thus he has remarked that many passages which interpreters have taken as the dogmatic expression of Plato's thought, are obviously expressions of irony or allegory on the philosopher's part. To distinguish between the two species of expression, therefore, he has first subjected to scrutiny the actual myths of Plato, and with the criteria thus gathered has proceeded to the investigation of all anomalous passages, hoping to prove by his tests that the same are allegorical utterances. He has thus constructed from the actual myths a working allegorical vocabulary for the interpretation of Plato's veiled myths, and has found that God, the idea of divinity, the idea of reminiscence, the pre-existence and survival of the soul, all belong to this category. The circulation and perusal of M. Couturat's thesis will not be enhanced by its being written in Latin.

While upon this subject attention should be called to a little brochure by W. Lutoslawski, Professor at the University of Kazan, on a new method of determining the chronology of the Dialogues of Plato, being a memoir read in May last before the Institute of France. Professor Lutoslawski gives here a brief outline of his comprehensive labors in this field, which to the special student will be of undoubted interest. As Professor Lutoslawski is at work upon an English volume, to be published by Longmans, and containing the full elaboration of his views, it is unnecessary for us to say anything more than that his researches are based upon the stylistic differences of the Platonic Dialogues as corroborated by the method of "logical comparisons" treated in this memoir. *μκρκ.*

A MACHINE FOR SOLVING NUMERICAL EQUATIONS.

A curious machine for the mechanical solution of equations, invented by Mr. George B. Grant of Boston, Mass., is described in the *American Machinist* for Sept. 3, 1896 (New York: 256 Broadway), which is of considerable theoretical interest, and if the delicacy of its construction bears out its author's claims, is not without practical importance. Five scale-beams, pivoted on parallel sliding car

riages vertically arranged and carrying negative and positive pans, have their right (positive) arms, AN, so jointed at variable points B as to act successively on one another. The *ratio* of the distances $AN/BN=x$ is kept uniform by means of a gearing, from the wheels of which through the carriage and guiding them run screws. This ratio is indicated on a graduated scale, having values from 1 to ∞, by a pointer attached to the fulcrum of the lower beam. Compounding the ratios of the jointed (positive) lever-arms we obtain the condition of equilibrium, and as the corresponding expression therefor, from the multiplication of four binomial factors, the typical equation of the fourth degree $\pm ax^4 \pm bx^3 \pm cx^2 \pm dx \pm e = 0$, the coefficients of which represent the weights to be placed in the respective positive and negative pans. The ratio of distances, or the root x of the equation, is then readily determined by turning a crank, being reached and indicated when the machine assumes equilibrium.

Since for x to be zero the distance BN would have to be infinitely great ($AN/BN=x$), the machine will not find roots approximating to zero; but this difficulty may be obviated by transformation. Also large roots cannot be determined with precision, for BN will have long passed below the limits of mechanical manipulation before x has attained very large values; in fact the distance between the values 1 and 2 on the scale is eight or nine times that between 16 and ∞. This also may be partly remedied by transformation. On the other hand, the machine does not require the multiple roots to be thrown out, nor that the co-efficient of the highest term should be either positive or unity. Also, since any beam may be left unweighted and hence the coefficient of the corresponding term reduced to zero, the machine will solve partial equations and consequently extract the roots of numbers representable in the common binomial form. The inventor claims it to be practicable to construct a machine delicate enough to find roots to two or three decimal places, so that the instrument might be used as a partial practical substitute for Sturm's theorem.

The free end of any beam, furnished with a pencil point, would trace a curve representing the equation. But the true equational curve must be indirectly produced. It is possible that with the appropriate mechanism, conquering the limitations of the machine, this curve might be directly traced; and it would then, at least for purposes of instruction, furnish a more powerful and certainly more graphic means of elucidating the equation than the scale. At the points of equilibrium the curve would cross the line of the abscissas and so indicate the roots measured on that line, we could see at a glance the character of the roots, etc. This geometrical method of investigating equations has a wide practical application and was beautifully presented a century ago by Lagrange, who even suggested an instrument for resolving upon this basis numerical equations of all degrees, without limitation of the positive or negative character, or magnitude, of the roots. It would be interesting to know if Lagrange's idea has ever been developed. (See the *Séances des Ecoles Normales* for 1794–1795.)

T. J. McC.

PERIODICALS.

REVUE DE MÉTAPHYSIQUE ET DE MORALE. Vol. IV. No. 4.

LA "GÉOMÉTRIE" DE DESCARTES AU POINT DE VUE DE SA MÉTHODE. By *B. Gibson.*—LA MÉTHODE DE DESCARTES AVANT LE DISCOURS. By *J. Berthet.*—LE DÉVELOPPEMENT DE LA PENSÉE DE DESCARTES DEPUIS LES "REGULÆ" JUSQU'AUX "MÉDITATIONS." By *P. Natorp.*—LA PREUVE ONTOLOGIQUE CARTÉSIENNE DÉFENDUE CONTRE LEIBNITZ. By *A. Hannequin.*—LES RECHERCHES DE DESCARTES SUR LA CONNAISSANCE DU MONDE EXTÉRIEUR. By *H. Schwarz.*—DESCARTES PHYSICIEN. By *P. Tannery.*—DESCARTES ET SNELLIUS, D'APRÈS QUELQUES DOCUMENTS NOUVEAUX. By *D. J. Korteweg.*—DU RAPPORT DE LA MORALE À LA SCIENCE DANS LA PHILOSOPHIE DE DESCARTES. By *E. Boutroux.*—LE TRAITÉ DES PASSIONS DE DESCARTES ET L'ETHIQUE DE SPINOZA. By *V. Brochard.*—L'INFLUENCE DE LA PHILOSOPHIE CARTÉSIENNE SUR LA LITTÉRATURE FRANÇAISE. By *G. Lanson.*—LE CHRISTIANISME DE DESCARTES. By *M. Blondel.*—DESCARTES JUGÉ PAR VICO. By *F. Tocco.*—CORRESPONDANCE DE DESCARTES (Autographes et copies manuscrites). By *Ch. Adam.*—(Paris: Armand Colin & Cie.)

The editors of the *Revue de Métaphysique et de Morale* have paid a fitting tribute to the memory of Descartes in this stately number of their journal. Descartes was born in 1596, and in commemoration of the third centenary of his birth, they have devoted a whole special number to the consideration of his life, work, and influence. The number has been made international in character, and all the principal countries of Europe have been represented. Descartes is treated under five aspects: (1) of his method; (2) of his metaphysics; (3) of his physics; (4) of his ethics; and (5) of his influence and personality. The wealth of matter offered by the *Revue* will be apparent from a glance at the contents, which are given above.

It may not be inopportune to mention on this occasion the project of a complete edition of the works of Descartes which the editors of the *Revue* have in hand, the cost of which is to be defrayed by international subscription. The edition will take up ten volumes of from seven hundred to seven hundred and fifty pages each, two of which are to be published yearly. Each volume will cost twenty-five francs, but may be had by subscribers to the *Revue* for fifteen francs. (Editor, M. Xavier Léon, 39 rue des Mathurins, Paris, France; Publishers, Armand Colin & Cie, 5 rue de Mézières. Yearly subscription, 15 francs.)

PROCEEDINGS OF THE ARISTOTELIAN SOCIETY FOR THE SYSTEMATIC STUDY OF PHILOSOPHY. Vol. III. No. 2.

PRESIDENTIAL ADDRESS.—Time and the Absolute. By *B. Bosanquet, M. A., LL. D.*—WHAT IS MEANT BY THE *A Priori* ELEMENT IN KNOWLEDGE? By

E. C. Benecke.—ANSELM'S ONTOLOGICAL ARGUMENT FOR THE EXISTENCE OF GOD. By *C. C. J. Webb, M. A.*—PHILOSOPHY AND NATURALISM. By *H. W. Blunt, B. A.*—PROFESSOR JAMES ON THE EMOTIONS. By *S. Bryant, D. Sc.*—KANT'S TELEOLOGY. By *C. L. Davies, M. A.*—SYMPOSIUM. In what Sense, if any, is it true that Psychical States are Extended? I. *G. F. Stout, M. A.*; II. *S. Bryant, D. Sc.*; III. *J. H. Muirhead, M. A.*—The *A Priori* IN GEOMETRY. By *Hon. B. Russell.*—SYMPOSIUM. Are Character and Circumstances Co-ordinate Factors in Human Life, or is Either Subordinate to the Other? I. *B. Bosanquet, M. A., LL. D.*; II. *E. E. C. Jones.*; III. *W. L. Gildea, D. D.*; IV. *A. F. Shand, M. A.*—APPENDIX.—(London: Williams and Norgate. Price, two shillings.)

THE PHILOSOPHICAL REVIEW. Vol. V. Nos. 4 and 5.

THE RELATION OF INTUITIONISM TO THE DOCTRINE OF SELF-REALISATION. By *Prof. Henry Calderwood.*—THE FOURTH DIMENSION OF SPACE. By *Prof. J. H. Hyslop.*—MORALITY THE LAST OF DOGMAS. By *Antonio Llano.*—DISCUSSIONS: I. Self-Consciousness, Social Consciousness, and Nature. By *Prof. J. E. Russell;* II. Mr. Balfour and Transcendental Idealism. By *Prof. R. B. Johnson;* III. The Intensive Statement of Particular and Negative Propositions. By *Prof. Margaret Washburn.*

IS MORALITY WITHOUT RELIGION POSSIBLE AND DESIRABLE? By *Prof. Otto Pfleiderer.*—THE IDEALISM OF SPINOZA. By *Prof. J. Clark Murray.*—ON THE RELATIONS OF PSYCHOLOGY TO OTHER SCIENCES. By *Dr. Harold Griffing.*—THE CAUSE AND FUNCTION OF CONSCIENCE. By *Prof. S. E. Mezes.*—BOOK REVIEWS, ETC.—(Boston, New York, Chicago: Ginn & Co.)

In the most notable and timely article of the September number of the *Philosophical Review*, Professor Pfleiderer sums up his reflexion on the relations of morality and religion as follows: "One must strive for the reformation of the church "in the name of the eternal religio-ethical idea. This can only be done from "within, along the line of historical development. Hence it can only be accom-"plished with the help of a scientific theology. Societies for Ethical Culture, which "despise these methods, are as helpless and impotent against the church as a band "of robbers before a strongly defended fortress. The only result of their efforts "will be that the religious sentiment of the community will suffer. Either there "will be a loss of religious and ethical convictions, and a consequent ethical retro-"gression, or their efforts will indirectly contribute to promote a reaction, having "as its consequence a relapse into dogmatism and ecclesiasticism. In both cases "the effect will be contrary to what they really desire. It is evident, therefore, "that those who are in earnest in demanding a truly ideal morality and a truly eth-"ical community must labor, not for a morality outside of the church, but for a "reformation within the church."

THE AMERICAN JOURNAL OF PSYCHOLOGY. Vol. VII. No. 4.

ON MUSCULAR MEMORY. By *Theodate L. Smith.*—A PRELIMINARY STUDY OF SOME OF THE MOTOR PHENOMENA OF MENTAL EFFORT. By *Ernest H. Lindley.*—LIGHT INTENSITY AND DEPTH PERCEPTION. By *T. B. Robinson, A. B.*—ATTENTION, EXPERIMENTAL AND CRITICAL. By *Frank Drew.*—PSYCHOLOGICAL LITERATURE.—NOTES.—(Worcester, Mass.: J. H. Orpha.)

THE PSYCHOLOGICAL REVIEW. VOL. III. No. 5.

STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF THE UNIVERSITY OF IOWA: On the Effects of Loss of Sleep: *G. T. W. Patrick*, and *J. Allen Gilbert*.—STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF HARVARD UNIVERSITY: I. The Relations of Intensity to Duration of Stimulation in Our Sensations of Light: *James E. Lough*. II. Normal Motor Automatism: *Leon M. Solomons* and *Gertrude Stein*.—ON THE CONDITIONS OF FATIGUE IN READING. By *Harold Griffing* and *Shepherd Ivory Franz*.—THE ACCURACY OF OBSERVATION AND OF RECOLLECTION IN SCHOOL-CHILDREN. By *Shepherd Ivory Franz* and *Henry F. Houston*.—DISCUSSION, ETC.—(New York: Macmillan & Co., 66 Fifth Avenue.)

ARCHIV FÜR SYSTEMATISCHE PHILOSOPHIE. Vol. II. No. 3.

DER BEGRIFF DES DASEINS UND DAS ICH-BEWUSSTSEIN. (II.) By *J. Bergmann*.—GRUNDLINIEN EINER THEORIE DER WILLENSBILDUNG. (III.) By *P. Natorp*.—DIE PSYCHOLOGISCHEN GRUNDLAGEN DER BEZIEHUNGEN ZWISCHEN SPRECHEN UND DENKEN. (I.) By *Benno Erdmann*.—JAHRESBERICHT ÜBER ERSCHEINUNGEN DER SOCIOLOGIE AUS DEN JAHREN 1893–1894, NEBST VORBERICHT. By *Ferdinand Tönnies*.—(Berlin: Georg Reimer.)

ZEITSCHRIFT FÜR PSYCHOLOGIE UND PHYSIOLOGIE DER SINNESORGANE. Vol. XI. Nos. 3, 4, 5 and 6. Vol. XII. No. 1.

UEBER KOMBINATIONSTÖNE UND EINIGE HIERZU IN BEZIEHUNG STEHENDE AKUSTISCHE ERSCHEINUNGEN. By *Max Meyer*.—UEBER DIE BEDEUTUNG DES WEBERSCHEN GESETZES. (II.) By *A. Meinong*.—DAS EINFACHSEHEN UND SEINE ANALOGIEN. By *Sigmund Reichard*.

VERSUCHE ÜBER DAS VERGLEICHEN VON WINKELVERSCHIEDENHEITEN. By *Dr. St. Witasek*.—ÆSTHETISCHE UNTERSUCHUNGEN IM ANSCHLUSS AN DIE LIPPSSCHE THEORIE DES KOMISCHEN. (II.) By *G. Heymans*.—UEBER DIE BEDEUTUNG DES WEBERSCHEN GESETZES. (III. Concluded.) By *A. Meinong*.—ZUR GESCHICHTE DER DREIFARBENLEHRE. By *W. Preyer*.—UEBER DEN SCHEINBAREN GRÖSSENWECHSEL DER NACHBILDER IM AUGE. By *W. Scharwin* and *A. Noviski*.—DIE AUFMERKSAMKEIT UND DIE FUNKTION DER SINNESORGANE. Zweiter Beitrag. By *W. Heinrich*.—ERWIDERUNG. By *G. Heymans*.

UEBER DEN EINFLUSS VON LICHTSTÄRKE UND ADAPTATION AUF DAS SEHEN DES DICHROMATEN (GRÜNBLINDEN). By *J. v. Kries* and *W. Nagel*.—DIE GEOMETRISCH-OPTISCHEN TÄUSCHUNGEN. (Vorläufige Mitteilung.) By *Th. Lipps*.—NEUE METHODE ZUR HERSTELLUNG HOMOGENER GRAUER FLÄCHEN VON VERSCHIEDENER HELLIGKEIT. By *Karl Marbe*.—LITTERATURBERICHT.—(Hamburg and Leipsic: Leopold Voss.)

VOL. VII. JANUARY, 1897. No. 2.

THE MONIST.

THE LOGIC OF RELATIVES.

§ 1. *Three Grades of Clearness.*—The third volume of Professor Schröder's *Exact Logic*,[1] which volume bears separately the title I have chosen for this paper, is exciting some interest even in this country. There are in America a few inquirers into logic, sincere and diligent, who are not of the genus that buries its head in the sand,—men who devote their thoughts to the study with a view to learning something that they do not yet know, and not for the sake of upholding orthodoxy, or any other foregone conclusion. For them this article is written as a kind of popular exposition of the work that is now being done in the field of logic. To them I desire to convey some idea of what the new logic is, how two "algebras," that is, systems of diagrammatical representation by means of letters and other characters, more or less analogous to those of the algebra of arithmetic, have been invented for the study of the logic of relatives, and how Schröder uses one of these (with some aid from the other and from other notations) to solve some interesting problems of reasoning. I also wish to illustrate one other of several important uses to which the new logic may be put. To this end I must first clearly show what a relation is.

Now there are three grades of clearness in our apprehensions of the meanings of words. The first consists in the connexion of

[1] *Algebra und Logik der Relative.* Leipsic: B. G. Teubner. 1895. Price, 16 M.

the word with familiar experience. In that sense, we all have a clear idea of what *reality* is and what *force* is,—even those who talk so glibly of mental force being correlated with the physical forces. The second grade consists in the abstract definition, depending upon an analysis of just what it is that makes the word applicable. An example of defective apprehension in this grade is Professor Tait's holding (in an appendix to the reprint of his Britannica article, *Mechanics*) that energy is "objective" (meaning it is a substance), because it is permanent, or "persistent." For independence of time does not of itself suffice to make a substance; it is also requisite that the aggregant parts should always preserve their identity, which is not the case in the transformations of energy. The third grade of clearness consists in such a representation of the idea that fruitful reasoning can be made to turn upon it, and that it can be applied to the resolution of difficult practical problems.

§ 2. *Of the term Relation in its first Grade of Clearness.*—An essential part of speech, the Preposition, exists for the purpose of expressing relations. Essential it is, in that no language can exist without prepositions, either as separate words placed before or after their objects, as case-declensions, as syntactical arrangements of words, or some equivalent forms. Such words as "brother," "slayer," "at the time," "alongside," "not," "characteristic property" are relational words, or *relatives*, in this sense, that each of them *becomes a general name when another general name is affixed to it as object.* In the Indo-European languages, in Greek, for example, the so-called genitive case (an inapt phrase like most of the terminology of grammar) is, very roughly speaking, the form most proper to the attached name. By such attachments, we get such names as "brother *of* Napoleon," "slayer *of* giants," "ἐπὶ Ἐλλισσαίου, at the time of Elias," "παρὰ ἀλλήλων, alongside *of* each other," "not guilty," "a characteristic property *of* gallium." *Not* is a relative because it means "other than"; *scarcely*, though a relational word of highly complex meaning, is not a relative. It has, however, to be treated in the logic of relatives. Other relatives do not become general names until two or more names have been thus

affixed. Thus, "giver to the city" is just such a relative as the preceding; for "giver to the city of a statue of himself" is a complete general name (that is, there might be several such humble admirers of themselves, though there be but one, as yet); but "giver" requires *two* names to be attached to it, before it becomes a complete name. The dative case is a somewhat usual form for the second object. The archaic instrumental and locative cases were serviceable for third and fourth objects.

Our European languages are peculiar in their marked differentiation of common nouns from verbs. *Proper* nouns must exist in all languages; and so must such "pronouns," or indicative words, as *this*, *that*, *something*, *anything*. But it is probably true that in the great majority of the tongues of men, distinctive common nouns either do not exist or are exceptional formations. In their meaning as they stand in sentences, and in many comparatively widely-studied languages, common nouns are akin to participles, as being mere inflexions of verbs. If a language has a verb meaning "is a man," a noun "man" becomes a superfluity. For all men are mortals is perfectly expressed by "Anything either is-a-man not or is-a-mortal." Some man is a miser is expressed by "Something both is-a-man and is-a-miser." The best treatment of the logic of relatives, as I contend, will dispense altogether with class names and only use such verbs. A verb requiring an object or objects to complete the sense may be called a *complete relative*.

A verb by itself signifies a mere dream, an imagination unattached to any particular occasion. It calls up in the mind an *icon*. A *relative* is just that, an icon, or image, without attachments to experience, without "a local habitation and a name," but with indications of the need of such attachments.

An indexical word, such as a proper noun or demonstrative or selective pronoun, has force to draw the attention of the listener to some hecceity common to the experience of speaker and listener. By a hecceity, I mean, some element of existence which, not merely by the likeness between its different apparitions, but by an inward force of identity, manifesting itself in the continuity of its apparition throughout time and in space, is distinct from every-

thing else, and is thus fit (as it can in no other way be) to receive a proper name or to be indicated as *this* or *that*. Contrast this with the signification of the verb, which is sometimes in my thought, sometimes in yours, and which has no other identity than the agreement between its several manifestations. That is what we call an abstraction or idea. The nominalists say it is a *mere* name. Strike out the "mere," and this opinion is approximately true. The realists say it *is* real. Substitute for "is," *may be*, that is, *is* provided experience and reason shall, as their final upshot, uphold the truth of the particular predicate, and the natural existence of the law it expresses, and this is likewise true. It is certainly a great mistake to look upon an idea, merely because it has not the mode of existence of a hecceity, as a lifeless thing.

The proposition, or sentence, signifies that an eternal fitness, or truth, a permanent conditional force, or law, attaches certain hecceities to certain parts of an idea. Thus, take the idea of "buying by—of—from—in exchange for—." This has four places where hecceities, denoted by indexical words, may be attached. The proposition "A buys B from C at the price D," signifies an eternal, irrefragable, conditional force gradually compelling those attachments in the opinions of inquiring minds.

Whether or not there be in the reality any definite separation between the hecceity-element and the idea-element is a question of metaphysics, not of logic. But it is certain that in the expression of a fact we have a considerable range of choice as to how much we will denote by the indexical and how much signify by iconic words. Thus, we have stated "all men are mortal" in such a form that there is but one index. But we may also state it thus: "Taking anything, either it possesses not humanity or it possesses mortality." Here "humanity" and "mortality" are really proper names, or purely denotative signs, of familiar ideas. Accordingly, as here stated, there are three indices. Mathematical reasoning largely depends on this treatment of ideas as things; for it aids in the iconic representation of the whole fact. Yet for some purposes it is disadvantageous. These truths will find illustration in § 13 below.

Any portion of a proposition expressing ideas but requiring something to be attached to it in order to complete the sense, is in a general way relational. But it is only a *relative* in case the attachment of indexical signs will suffice to make it a proposition, or, at least, a complete general name. Such a word as *exceedingly* or *previously* is relational, but is not a relative, because significant words require to be added to it to make complete sense.

§ 3. *Of Relation in the Second Grade of Clearness.*—Is relation anything more than a connexion between two things? For example, can we not state that A gives B to C without using any other relational phrase than that one thing is connected with another? Let us try. We have the general idea of *giving*. Connected with it are the general ideas of *giver*, *gift*, and "*donee*." We have also a particular transaction connected with no general idea except through that of giving. We have a first party connected with this transaction and also with the general idea of giver. We have a second party connected with that transaction, and also with the general idea of "donee." We have a subject connected with that transaction and also with the general idea of gift. A is the only hecceity directly connected with the first party; C is the only hecceity directly connected with the second party, B is the only hecceity directly connected with the subject. Does not this long statement amount to this, that A gives B to C?

In order to have a distinct conception of Relation, it is necessary not merely to answer this question but to comprehend the reason of the answer. I shall answer it in the negative. For, in the first place, if relation were nothing but connexion of two things, all things would be connected. For certainly, if we say that A is unconnected with B, that non-connexion is a relation between A and B. Besides, it is evident that any two things whatever make a pair. Everything, then, is equally related to everything else, if mere connexion be all there is in relation. But that which is equally and necessarily true of everything is no positive fact, at all. This would reduce relation, considered as simple connexion between two things, to nothing, unless we take refuge in saying that relation *in general* is indeed nothing, but that *modes* of relation are some-

thing. If, however, these different modes of relation are different modes of connexion, relation ceases to be simple bare connexion. Going back, however, to the example of the last paragraph, it will be pointed out that the peculiarity of the mode of connexion of A with the transaction consists in A's being in connexion with an element connected with the transaction, which element is connected with the peculiar general idea of a *giver*. It will, therefore, be said, by those who attempt to defend an affirmative answer to our question, that the peculiarity of a mode of connexion consists in this, that that connexion is indirect and takes place through something which is connected with a peculiar general idea. But I say that is no answer at all; for if all things are equally connected, nothing can be more connected with one idea than with another. This is unanswerable. Still, the affirmative side may modify their position somewhat. They may say, we grant that it is necessary to recognise that relation is something more than connexion; it is *positive* connexion. Granting that all things are connected, still all are not positively connected. The various modes of relationship are, then, explained as above. But to this I reply: you propose to make the peculiarity of the connexion of A with the transaction depend (no matter by what machinery) upon that connexion having a positive connexion with the idea of a giver. But "positive connexion" is not enough; the relation of the general idea is quite peculiar. In order that it may be characterised, it must, on your principles, be made indirect, taking place through something which is itself connected with a general idea. But this last connexion is again more than a mere general positive connexion. The same device must be resorted to, and so on *ad infinitum*. In short, you are guilty of a *circulus in definiendo*. You make the relation of any two things consist in their connexion being connected with a general idea. But that last connexion is, on your own principles, itself a *relation*, and you are thus defining relation by relation; and if for the second occurrence you substitute the definition, you have to repeat the substitution *ad infinitum*.

The affirmative position has consequently again to be modified. But, instead of further tracing possible tergiversations, let us di-

rectly establish one or two positive positions. In the first place, I say that every relationship concerns some definite number of correlates. Some relations have such properties that this fact is concealed. Thus, any number of men may be brothers. Still, brotherhood is a relation between pairs. If A, B, and C are all brothers, this is merely the consequence of the three relations, A is brother of B, B is brother of C, C is brother of A. Try to construct a relation which shall exist either between two or between three things such as "—is either a brother or betrayer of—to—." You can only make sense of it by somehow interpreting the dual relation as a triple one. We may express this as saying that every relation has a definite number of blanks to be filled by indices, or otherwise. In the case of the majority of relatives, these blanks are qualitatively different from one another. These qualities are thereby communicated to the connexions.

In a complete proposition there are no blanks. It may be called a *medad*, or *medadic relative*, from *μηδαμός*, none, and *-άδα* the accusative ending of such words as *μόνας, δυάς, τριάς, τετράς*, etc.[1] A non-relative name with a substantive verb, as "—is a man," or "man that is—," or "—'s manhood" has one blank; it is a *monad*, or *monadic relative*. An ordinary relative with an active verb as "—is a lover of—" or "the loving by—of—" has two blanks; it is a *dyad*, or *dyadic relative*. A higher relative similarly treated has a plurality of blanks. It may be called a *polyad*. The rank of a relative among these may be called its *adinity*, that is, the peculiar quality of the number it embodies.

A *relative*, then, may be defined as the equivalent of a word or phrase which, either as it is (when I term it a *complete* relative), or else when the verb "is" is attached to it (and if it wants such attachment, I term it a *nominal* relative), becomes a sentence with some number of proper names left blank. A *relationship*, or *fundamentum relationis*, is a fact relative to a number of objects, consid-

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[1] The Pythagoreans, who seem first to have used these words, probably attached a patronymic signification to the termination. A *triad* was derivative of *three*, etc.

ered apart from those objects, as if, after the statement of the fact, the designations of those objects had been erased. A *relation* is a relationship considered as something that may be said to be true of one of the objects, the others being separated from the relationship yet kept in view. Thus, for each relationship there are as many relations as there are blanks. For example, corresponding to the relationship which consists in one thing loving another there are two relations, that of loving and that of being loved by. There is a nominal relative for each of these relations, as "lover of—," and "loved by—." These nominal relatives belonging to one relationship, are in their relation to one another termed *correlatives*. In the case of a dyad, the two correlatives, and the corresponding relations are said, each to be the *converse* of the other. The objects whose designations fill the blanks of a complete relative are called the *correlates*. The correlate to which a nominal relative is attributed is called the *relate*.

In the statement of a relationship, the designations of the correlates ought to be considered as so many *logical subjects* and the relative itself as the *predicate*. The entire set of logical subjects may also be considered as a *collective subject*, of which the statement of the relationship is *predicate*.

§ 4. *Of Relation in the third Grade of Clearness.*—Mr. A. B. Kempe has published in the *Philosophical Transactions* a profound and masterly "Memoir on the Theory of Mathematical Form," which treats of the representation of relationships by "Graphs," which is Clifford's name for a diagram, consisting of spots and lines, in imitation of the chemical diagrams showing the constitution of compounds. Mr. Kempe seems to consider a relationship to be nothing but a complex of bare connexions of pairs of objects, the opinion refuted in the last section. Accordingly, while I have learned much from the study of his memoir, I am obliged to modify what I have found there so much that it will not be convenient to cite it; because long explanations of the relation of my views to his would become necessary if I did so.

A chemical atom is quite like a relative in having a definite number of loose ends or "unsaturated bonds," corresponding to

the blanks of the relative. In a chemical molecule, each loose end of one atom is joined to a loose end, which it is assumed must belong to some other atom, although in the vapor of mercury, in argon, etc., two loose ends of the same atom would seem to be joined; and why pronounce such hermaphrodism impossible? Thus the chemical molecule is a *medad*, like a complete proposition. Regarding proper names and other indices, after an "is" has been attached to them, as monads, they, together with other monads, correspond to the two series of chemical elements, H, Li, Na, K, Rb, Cs, etc., and Fl, Cl, Br, I. The dyadic relatives correspond to the two series, Mg, Ca, Sr, Ba, etc., and O, S, Se, Te, etc. The triadic relatives correspond to the two series B, Al, Zn, In, Tl, etc., and N, P, As, Sb, Bi, etc. Tetradic relatives are, as we shall see, a superfluity; they correspond to the series C, Si, Ti, Sn, Ta, etc. The proposition "John gives John to John" corresponds in

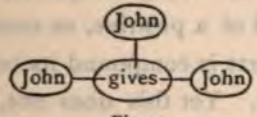

Fig. 1.

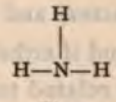

Fig. 2.

its constitution, as Figs. 1 and 2 show, precisely to ammonia.

But beyond this point the analogy ceases to be striking. In fact, the analogy with the ruling theory of chemical compounds quite breaks down. Yet I cannot resist the temptation to pursue it. After all, any analogy, however fanciful, which serves to focus attention upon matters which might otherwise escape observation is valuable. A chemical compound might be expected to be quite as much like a proposition as like an algebraical invariant; and the brooding upon chemical graphs has hatched out an important theory in invariants. Fifty years ago, when I was first studying chemistry, the theory was that every compound consisted of two oppositely electrified atoms or radicles; and in like manner every compound radicle consisted of two opposite atoms or radicles. The argument to this effect was that chemical attraction is evidently between things unlike one another and evidently has a saturation point; and further that we observe that it is the elements the most

extremely unlike which attract one another. Lothar Meyer's curve having for its ordinates the atomic volumes of the elements and for its abscissas their atomic weights tends to support the opinion that elements strongly to attract one another must have opposite characters; for we see that it is the elements on the steepest downward slopes of that curve which have the strongest attractions for the elements on the steepest upward inclines. But when chemists became convinced of the doctrine of valency, that is, that every element has a fixed number of loose ends, and when they consequently began to write graphs for compounds, it seems to have been assumed that this necessitated an abandonment of the position that atoms and radicles combine by opposition of characters, which had further been weakened by the refutation of some mistaken arguments in its favor. But if chemistry is of no aid to logic, logic here comes in to enlighten chemistry. For in logic, the medad must always be composed of one part having a negative, or antecedental, character, and another part of a positive, or consequental, character; and if either of these parts is compound its constituents are similarly related to one another. Yet this does not, at all, interfere with the doctrine that each relative has a definite number of blanks or loose ends. We shall find that, in logic, the negative character is a character of reversion in this sense, that if the negative part of a medad is compound, *its* negative part has, on the whole, a positive character. We shall also find, that if the negative part of a medad is compound, the bond joining its positive and negative parts has its character reversed, just as those relatives themselves have.

Several propositions are in this last paragraph stated about logical medads which now must be shown to be true. In the first place, although it be granted that every relative has a definite number of blanks, or loose ends, yet it would seem, at first sight, that there is no need of each of these joining no more than one other. For instance, taking the triad "—kills—to gratify—," why may not the three loose ends all join in one node and then be connected with the loose end of the monad "John is—" as in Fig. 3 making the proposition "John it is that kills what is John to gratify what

is John"? The answer is, that a little exercise of generalising power will show that such a four-way node is really a tetradic relative,

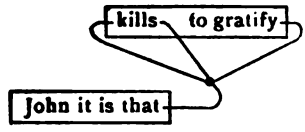

Fig. 3.

which may be expressed in words thus, "—is identical with—and with—and with—"; so that the medad is really equivalent to that

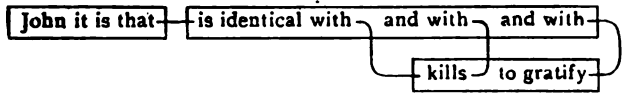

Fig. 4.

of Fig. 4, which corresponds to prussic acid as shown in Fig. 5.

Fig. 5.

Thus, it becomes plain that every node of bonds is equivalent to a relative; and the doctrine of valency is established for us in logic.

We have next to inquire into the proposition that in every combination of relatives there is a negative and a positive constituent. This is a corollary from the general logical doctrine of the illative character of the copula, a doctrine precisely opposed to the opinion of the quantification of the predicate. A satisfactory discussion of this fundamental question would require a whole article. I will only say in outline that it can be positively demonstrated in several ways that a proposition of the form "man = rational animal," is a compound of propositions each of a form which may be stated thus: "*Every* man (if there be any) is a rational animal" or "Men are *exclusively* (if anything) rational animals." Moreover, it must be acknowledged that the illative relation (that expressed by "therefore") is the most important of logical relations, the be-all and the end-all of the rest. It can be demonstrated that formal logic needs no other elementary logical relation than this;

but that with a symbol for this and symbols of relatives, including monads, and with a mode of representing the attachments of them, all syllogistic may be developed, far more perfectly than any advocate of the quantified predicate ever developed it, and in short in a way which leaves nothing to be desired. This in fact *will* be virtually shown in the present paper. It can further be shown that no other copula will of itself suffice for all purposes. Consequently, the copula of equality ought to be regarded as merely derivative.

Now, in studying the logic of relatives we must sedulously avoid the error of regarding it as a highly specialised doctrine. It is, on the contrary, nothing but formal logic generalised to the very tip-top. In accordance with this view, or rather with this theorem (for it is susceptible of positive demonstration), we must regard the *relative copula*, which is the bond between two blanks of relatives, as only a generalisation of the ordinary copula, and thus of the "*ergo*." When we say that from the proposition A the proposition B necessarily follows, we say that "the truth of A in *every way* in which it can exist at all is the truth of B," or otherwise stated "A is true *only* in so far as B is true." This is the very same relation which we express when we say that "*every* man is mortal," or "men are *exclusively* mortals." For this is the same as to say, "Take anything whatever, M; then, if M is a man, it follows necessarily that M is mortal." This mode of junction is essentially the same as that between the relatives in the compound relative "lover, in *every* way in which it may be a lover at all, of a servant," or, otherwise expressed, "lover (if at all) *exclusively* of servants." For to say that "Tom is a lover (if at all) only of servants of Dick," is the same as to say "Take anything whatever, M; then, if M is loved by Tom, M is a servant of Dick," or "everything there may be that is loved by Tom is a servant of Dick."

Now it is to be observed that the illative relation is not simply convertible; that is to say, that "from A necessarily follows B" does not necessarily imply that "from B necessarily follows A." Among the vagaries of some German logicians of some of the inexact schools, the convertibility of illation (like almost every other imaginable absurdity) has been maintained; but all the other in-

exact schools deny it, and exact logic condemns it, at once. Consequently, the copula of inclusion, which is but the *ergo* freed from the accident of asserting the truth of its antecedent, is equally inconvertible. For though "men include only mortals," it does not follow that "mortals include *only* men," but, on the contrary, what follows is "mortals include *all* men." Consequently, again, the fundamental *relative copula* is inconvertible. That is, because "Tom loves (if anybody) only a servant (or servants) of Dick," it does not follow that "Dick is served (if at all) only by somebody loved by Tom," but, on the contrary, what follows is "Dick is master of *every* person (there may be) who is loved by Tom." We thus see clearly, first, that, as the fundamental relative copula, we must take that particular mode of junction; secondly, that that mode is at bottom the mode of junction of the *ergo*, and so joins a relative of antecedental character to a relative of consequental character; and, thirdly, that that copula is inconvertible, so that the two kinds of constituents are of opposite characters. There are, no doubt, convertible modes of junction of relatives, as in "lover of a servant;[1] but it will be shown below that these are complex and indirect in their constitution.

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[1] Professor Schröder proposes to substitute the word "symmetry" for *convertibility*, and to speak of *simply convertible* modes of junction as "symmetrical.' Such an example of wanton disregard of the admirable traditional terminology of logic, were it widely followed, would result in utter uncertainty as to what any

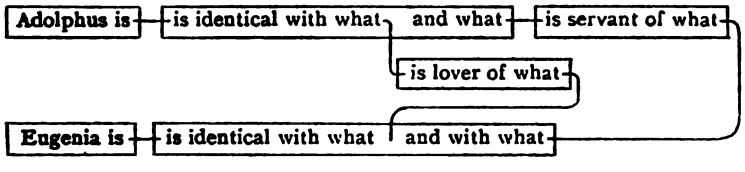

Fig. 6.

writer on logic might mean to say, and would thus be utterly fatal to all our efforts to render logic exact. Professor Schröder denies that the mode of junction in "lover of a servant" is "symmetrical," which word in practice he makes synonymous with "commutative," applying it only to such junctions as that between "lover" and "servant" in "Adolphus is at once lover and servant of Eugenia." Commutativity depends on one or more polyadic relatives having two like blanks as shown in Fig. 6.

It remains to be shown that the antecedent part of a medad has a negative, or reversed, character, and how this, in case it be compound, affects both its relatives and their bonds. But since this matter is best studied in examples, I will first explain how I propose to draw the logical graphs.

It is necessary to use, as the sign of the relative copula, some symbol which shall distinguish the antecedent from the consequent; and since, if the antecedent is compound (owing to the very character which I am about to demonstrate, namely, its reversing the characters of the relatives and the bonds it contains), it is very important to know just how much is included in that antecedent, while it is a matter of comparative indifference how much is included in the consequent (though it is simply everything not in the antecedent), and since further (for the same reason) it is important to know how many antecedents, each after the first a part of another, contain a given relative or copula, I find it best to make the line which joins antecedent and consequent encircle the whole of the former. Letters of the alphabet may be used as abbreviations of complete relatives; and the proper number of bonds may be attached to each. If one of these is encircled, that circle must have a bond corresponding to each bond of the encircled letter. Chemists sometimes write above atoms Roman numerals to indicate their *adinities;* but I do not think this necessary. Fig. 7 shows, in a com-

Fig. 7.

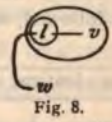

Fig. 8.

plete medad, my sign of the relative copula. Here, *h* is the monad "—is a man," and *d* is the monad "—is mortal." The antecedent is completely enclosed, and the meaning is "Anything whatever, if it be a man, is mortal." If the circle encloses a dyadic or polyadic relative, it must, of course, have a tail for every bond of that relative. Thus, in Fig. 8, *l* is the dyad "—loves—," and it is important to remark that the bond to the left is the lover and that to the right is the loved. Monads are the only relatives for which we need not be attentive to the positions of attachment of the bonds. In this figure,

w is the monad "—is wise," and *v* is the monad "—is virtuous." The *l* and *v* are enclosed in a large common circle. Had this not been done, the medad could not be read (as far as any rules yet given show), because it would not consist of antecedent and consequent. As it is, we begin the reading of the medad at the bond connecting antecedent and consequent. Every bond of a logical graph denotes a hecceity; and every unencircled bond (as this one is) stands for any hecceity the reader may choose from the universe. This medad evidently refers to the universe of men. Hence the interpretation begins: "Let M be any man you please." We proceed along this bond in the direction of the antecedent, and on entering the circle of the antecedent we say: "If M be." We then enter the inner circle. Now, entering a circle means a relation to *every*. Accordingly we add "whatever." Traversing *l* from left to right, we say "lover." (Had it been from right to left we should have read it "loved.") Leaving the circle is the mark of a relation "only to," which words we add. Coming to *v* we say "what is virtuous." Thus our antecedent reads: "Let M be any man you please. If M be whatever it may that is lover only to the virtuous." We now return to the consequent and read, "M is wise." Thus the whole means, "Whoever loves only the virtuous is wise."

As another example, take the graph of Fig. 9, where *l* has the

Fig. 9.

same meaning as before and *m* is the dyad "—is mother of—." Suppose we start with the left hand bond. We begin with saying "Whatever." Since cutting this bond does not sever the medad, we proceed at once to read the whole as an unconditional statement and we add to our "whatever" "there is." We can now move round the ring of the medad either clockwise or counter-clockwise. Taking the last way, we come to *l* from the left hand and therefore add "is a lover." Moving on, we enter the circle round *m;* and entering a circle is a sign that we must say "of *every thing* that." Since we pass through *m* backwards we do not read "is mother" but "is mothered" or "has for mother." Then, since we pass *out*

of the circle we should have to add "only"; but coming back, as we do, to the starting point, we need only say "that same thing." Thus, the interpretation is "Whatever there is, is lover of everything that has for mother that same thing," or "Every woman loves everything of which she is mother." Starting at the same point and going round the other way, the reading would be "Everybody is mother (if at all) only of what is loved by herself." Starting on the right and proceeding clockwise, "Everything is loved by every mother of itself." Proceeding counter-clockwise, "Everything has for mothers only lovers of itself."

Triple relatives afford no particular difficulty. Thus, in Fig. 10, *w* and *v* have the same significations as before; *r* is the monad, "—is a reward," and *g* is the triad "—gives ⌉ to —." It can be read either

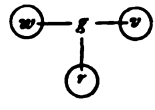

Fig. 10.

"Whatever is wise gives every reward to every virtuous person," or "Every virtuous person has every reward given to him by everybody that is wise," or "Every reward is given by everybody who is wise to every virtuous person."

A few more examples will be instructive. Fig. 11, where A is the proper name Alexander means "Alexander loves only the virtuous," i. e., "Take anybody you please; then, if he be Alexander and if he loves anybody, this latter is virtuous."

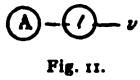

Fig. 11.

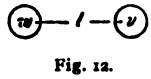

Fig. 12.

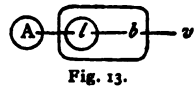

Fig. 13.

If you attempt, in reading this medad, to start to the right of *l*, you fall into difficulty, because your antecedent does not then consist of an antecedent and consequent, but of two circles joined by a bond, a combination to be considered below. But Fig. 12 may be read with equal ease on whichever side of *l* you begin, whether as "whoever is wise loves everybody that is virtuous," or "whoever is virtuous is loved by everybody that is wise." If in Fig. 13

$-b-$ be the dyad "—is a benefactor of—," the medad reads, "Alexander stands only to virtuous persons in the relation of loving only their benefactors."

Fig. 14, where $-s-$ is the dyad "—is a servant of —" may be read, according to the above principles, in the several ways following:

"Whoever stands to any person in the relation of lover to none but his servants benefits him."

"Every person stands only to a person benefited by him in the relation of a lover only of a servant of that person."

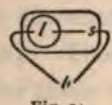

Fig. 14.

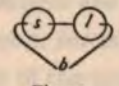

Fig. 15.

"Every person, M, is benefactor of everybody who stands to M in the relation of being served by everybody loved by him."

"Every person, N, is benefited by everybody who stands to N in the relation of loving only servants of him."

"Every person, N, stands only to a benefactor of N in the relation of being served by everybody loved by him."

"Take any two persons, M and N. If, then, N is served by every lover of M, N is benefited by M."

Fig. 15 represents a medad which means, "Every servant of any person, is a benefactor of whomever may be loved by that person." Equivalent statements easily read off from the graphs are as follows:

"Anybody, M, no matter who, is servant (if at all) only of somebody who loves (if at all) only persons benefited by M."

"Anybody, no matter who, stands to every master of him in the relation of benefactor of whatever person may be loved by him."

"Anybody, no matter who, stands to whoever loves him in the relation of being benefited by whatever servant he may have."

"Anybody, N, is loved (if at all) only by a person who is served (if at all) only by benefactors of N."

"Anybody, no matter who, loves (if at all) only persons benefited by all servants of his."

"Anybody, no matter who, is served (if at all) only by benefactors of everybody loved by him."

I will now give an example containing triadic relatives, but no monads. Let ϕ be "—prevents—from communicating with—," the second blank being represented by a bond from the right of ϕ and the third by a bond from below ϕ. Let β mean "—would betray—to—," the arrangement of bonds being the same as with ϕ. Then, Fig. 16 means that "whoever loves only persons who pre-

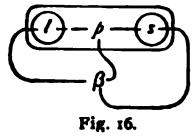

Fig. 16.

vent every servant of any person, A, from communicating with any person, B, would betray B to A." I will only notice one equivalent statement, viz.: "Take any three persons, A, B, C, no matter who. Then, either C betrays B to A, or else two persons, M and N, can be found, such that M does not prevent N from communicating with B, although M is loved by C and N is a servant of A."

This last interpretation is an example of the method which is, by far, the plainest and most unmistakable of any in complicated cases. The rule for producing it is as follows:

1. Assign a letter of the alphabet to denote the hecceity represented by each bond.[1]

2. Begin by saying: "Take any things you please, namely," and name the letters representing bonds not encircled; then add, "Then suitably select objects, namely," and name the letters representing bonds each once encircled; then add, "Then take any things you please, namely," and name the letters representing bonds each twice encircled. Proceed in this way until all the letters

[1] In my method of graphs, the spots represent the relatives, their bonds the hecceities; while in Mr. Kempe's method, the spots represent the objects, whether individuals or abstract ideas, while their bonds represent the relations. Hence, my own exclusive employment of bonds between pairs of spots does not, in the least, conflict with my argument that in Mr. Kempe's method such bonds are insufficient.

representing bonds have been named, no letter being named until all those encircled fewer times have been named; and each hecceity corresponding to a letter encircled odd times is to be suitably chosen according to the intent of the assertor of the medad proposition, while each hecceity corresponding to a bond encircled even times is to be taken as the interpreter or the opponent of the proposition pleases.

3. Declare that you are about to make statements concerning certain propositions, to which, for the sake of convenience, you will assign numbers in advance of enunciating them or stating their relations to one another. These numbers are to be formed in the following way. There is to be a number for each letter of the medad (that is for those which form spots of the graph, not for the letters assigned by clause 1 of this rule to the bonds), and also a number for each circle round more than one letter; and the first figure of that number is to be a 1 or a 2, according as the letter or the circle is in the principal antecedent or the principal consequent; the second figure is to be 1 or 2, according as the letter or the circle belongs to the antecedent or the consequent of the principal antecedent or consequent, and so on.

Declare that one or other of those propositions whose numbers contain no 1 before the last figure is true. Declare that each of those propositions whose numbers contain an odd number of 1's before the last figure consists in the assertion that *some one* or another of the propositions whose numbers commence with its number is true. For example, 11 consists in the assertion that either 111 or 1121 or 1122 is true, supposing that these are the only propositions whose numbers commence with 11. Declare that each of those propositions whose numbers contain an even number of 1's (or none) before the last figure consists in the assertion that *every one of* the propositions whose numbers commence with its number is true. Thus, 12 consists in the assertion that 121, 1221, 1222 are all true, provided those are the only propositions whose numbers commence with 12. The process described in this clause will be abridged except in excessively complicated cases.

4. Finally, you are to enunciate all those numbered proposi-

tions which correspond to single letters. Namely, each proposition whose number contains an even number of 1's, will consist in affirming the relative of the spot-letter to which that number corresponds after filling each blank with that bond-letter which by clause 1 of this rule was assigned to the bond at that blank. But if the number of the proposition contains an odd number of 1's, the relative, with its blanks filled in the same way, is to be denied.

In order to illustrate this rule, I will restate the meanings of the medads of Figs. 7–16, in all the formality of the rule; although such formality is uncalled for and awkward, except in far more complicated cases.

Fig. 7. Let A be anything you please. There are two propositions, 1 and 2, one of which is true. Proposition 1 is, that A is not a man. Proposition 2 is, that A is mortal. More simply, Whatever A may be, either A is not a man or A is mortal.

Fig. 8. Let A be anybody you please. Then, I will find a person, B, so that either proposition 1 or proposition 2 shall be true. Proposition 1 asserts that both propositions 11 and 12 are true. Proposition 11 is that A loves B. Proposition 12 is that B is not virtuous. Proposition 2 is that A is wise. More simply, Take anybody, A, you please. Then, either A is wise, or else a person, B, can be found such that B is not virtuous and A loves B.

Fig. 9. Let A and B be any persons you please. Then, either proposition 1 or proposition 2 is true. Proposition 1 is that A is not a mother of B. Proposition 2 is that A loves B. More simply, whatever two persons A and B may be, either A is not a mother of B or A loves B.

Fig. 10. Let A, B, C be any three things you please. Then, one of the propositions numbered, 1, 21, 221, 222 is true. Proposition 1 is that A is not wise. Proposition 21 is that B is not a reward. Proposition 221 is that C is not virtuous. Proposition 222 is that A gives B to C. More simply, take any three things, A, B, C, you please. Then, either A is not wise, or B is not a reward, or C is not virtuous, or A gives B to C.

Fig. 11. Take any two persons, A and B, you please. Then, one of the propositions 1, 21, 22 is true. 1 is that A is not Alex-

er. 21 is that A does not love B. Proposition 3 is that B is uous.

Fig. 12. Take any two persons, A and B. Then, one of the positions 1, 21, 22 is true. 1 is that A is not wise. 21 is that s not virtuous. 22 is that A loves B.

Fig. 13. Take any two persons, A and C. Then a person, an be found such that one of the propositions 1, 21, 22 is true. position 21 asserts that both 211 and 212 are true. Proposition at A is not Alexander. Proposition 211 is that A loves B. Propion 212 is that B does not benefit C. Proposition 22 is that C irtuous. More simply, taking any two persons, A and C, either not Alexander, or C is virtuous, or there is some person, B, is loved by A without benefiting C.

Fig. 14. Take any two persons, A and B, and I will then se- a person C. Either proposition 1 or proposition 2 is true. position 1 is that both 11 and 12 are true. Proposition 11 is t A loves C. Proposition 12 is that C is not a servant of B. position 2 is that A benefits B. More simply, of any two pers, A and B, either A benefits the other, B, or else there is a son, C, who is loved by A but is not a servant of B.

Fig. 15. Take any three persons, A, B, C. Then one of the positions 1, 21, 22 is true. 1 is that A is not a servant of B; is that B is not a lover of C; 22 is that A benefits C.

Fig. 16. Take any three persons, A, B, C. Then I can so se- D and E, that one of the propositions 1 or 2 is true. 1 is that and 121 and 122 are all true. 11 is that A loves D, 121 is that s a servant of C, 122 is that D does not prevent E from comnicating with B. 2 is that A betrays B to C.

I have preferred to give these examples rather than fill my ges with a dry abstract demonstration of the correctness of the e. If the reader requires such a proof, he can easily construct it. is rule makes evident the reversing effect of the encirclements, only upon the "quality" of the relatives as affirmative or nega-, but also upon the selection of the hecceities as performable advocate or opponent of the proposition, as well as upon the junctions of the propositions as disjunctive or conjunctive, or

(to avoid this absurd grammatical terminology) as alternative or simultaneous.

It is a curious example of the degree to which the thoughts of logicians have been tied down to the accidents of the particular language they happened to write (mostly Latin), that while they hold it for an axiom that two *nots* annul one another, it was left for me to say as late as 1867[1] that *some* in formal logic ought to be understood, and could be understood, so that *some-some* should mean *any*. I suppose that were ordinary speech of any authority as to the forms of logic, in the overwhelming majority of human tongues two negatives intensify one another. And it is plain that if "not" be conceived as less than anything, what is less than that is *a fortiori* not. On the other hand, although *some* is conceived in our languages as *more than none*, so that two "somes" intensify one another, yet what it ought to signify for the purposes of syllogistic is that, instead of the selection of the instance being left,—as it is, when we say "any man is not good,"—to the opponent of the proposition, when we say "some man is not good," this selection is transferred to the opponent's opponent, that is to the defender of the proposition. Repeat the some, and the selection goes to the opponent's opponent's opponent, that is, to the opponent again, and it becomes equivalent to *any*. In more formal statement, to say "Every man is mortal," or "Any man is mortal," is to say, "A man, as suitable as any to prove the proposition false, is mortal," while "Some man is mortal" is equivalent to "A man, as suitable as any to prove the proposition *not* false, is mortal." "Some-some man is mortal" is accordingly "A man, as suitable as any to prove the proposition *not not*-false, is mortal."

In like manner, encircled $2N+1$ times, a disjunctive conjunction of propositions becomes a copulative conjunction. Here, the case is altogether similar. Encircled even times, the statement is that some one (or more) of the propositions is true; encircled odd times, the statement is that any one of the propositions is true.

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[1] "On the Natural Classification of Arguments." *Proceedings of the American Academy of Arts and Sciences.*

The negative of "lover of every servant" is "non-lover of some servant." The negative of "lover every way (that it is a lover) of a servant" is "lover some way of a non-servant."

The general nature of a relative and of a medad has now been made clear. At any rate, it will become so, if the reader carefully goes through with the explanations. We have not, however, as yet shown how every kind of proposition can be graphically expressed, nor under what conditions a medad is necessarily true. For that purpose it will be necessary to study certain special logical relatives.

§ 5. *Triads the primitive relatives.*—That out of triads all polyads can be constructed is made plain by Fig. 17.

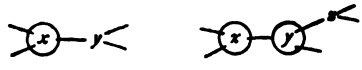

Fig. 17.

Fig. 18 shows that from two triads a dyad can be made. Fig. 19 shows that from one triad a monad can be made. Fig. 20 shows

Fig. 18.

Fig. 19.

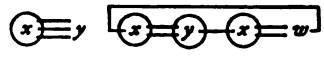

Fig. 20.

that from any even number of triads a medad can be made. In general, the union of a μ-ad and a ν-ad gives a $(\mu+\nu-2\lambda)$-ad, where λ is the number of bonds of union. This formula shows that *artiads*, or even-ads, can produce only *artiads*. But any perissid, or odd-ad (except a monad), can by repetition produce a relative of any *adinity*.

Since the principal object of a notation for relatives is not to produce a handy *calculus* for the solution of special logical problems, but to help the study of logical principles, the study of logical graphs from that point of view must be postponed to a future occasion. For present purposes that notation is best which carries analysis the furthest, and presents the smallest number of unanalyzed forms. It will be best, then, to use single letters for relatives of some one definite and odd number of blanks. We

naturally choose three as the smallest number which will answer the purpose.

We shall, therefore, substitute for such a dyad as "—is lover of—" some such triad as "—is coexistent with | and a lover of—." If, then, we make $-\underset{|}{w}-$ to signify "—is coexistent with | and with —," that which we have hitherto written as in Fig. 12 will be written as in Fig. 21. But having once recognised that such a mode

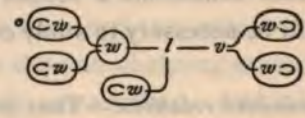

Fig. 21.

of writing is possible, we can continue to use our former methods, provided we now consider them as abbreviations.

The logical doctrine of this section, must, we may remark, find its application in metaphysics, if we are to accept the Kantian principle that metaphysical conceptions mirror those of formal logic.

§ 6. *Relatives of Second Intention.*—The general method of graphical representation of propositions has now been given in all its essential elements, except, of course, that we have not, as yet, studied any truths concerning special relatives; for to do so would seem, at first, to be "extralogical." Logic in this stage of its development may be called *paradisaical logic*, because it represents the state of Man's cognition before the Fall. For although, with this apparatus, it is easy to write propositions necessarily true, it is absolutely impossible to write any which is necessarily false, or, in any way which that stage of logic affords, to find out that anything is false. The mind has not as yet eaten of the fruit of the Tree of Knowledge of Truth and Falsity. Probably it will not be doubted that every child in its mental development necessarily passes through a stage in which he has some ideas, but yet has never recognised that an idea may be erroneous; and a stage that every child necessarily passes through must have been formerly passed through by the race in its adult development. It may be doubted whether many of the lower animals have any clear and

steady conception of falsehood; for their instincts work so unerringly that there is little to force it upon their attention. Yet plainly without a knowledge of falsehood no development of discursive reason can take place.

This paradisaical logic appears in the study of non-relative formal logic. But *there* no possible avenue appears by which the knowledge of falsehood could be brought into this Garden of Eden except by the arbitrary and inexplicable introduction of the Serpent in the guise of a proposition necessarily false. The logic of relatives, affords such an avenue, and *that*, the very avenue by which in actual development, this stage of logic supervenes. It is the avenue of experience and logical reflexion.

By *logical* reflexion, I mean the observation of thoughts in their expressions. Aquinas remarked that this sort of reflexion is requisite to furnish us with those ideas which, from lack of contrast, ordinary external experience fails to bring into prominence. He called such ideas *second intentions*. It is by means of *relatives of second intention* that the general method of logical representation is to find completion.

Let ⋉ signify that "—is $\left\{\begin{array}{l}\text{neither—}\\ \text{nor—}\end{array}\right.$." Then Fig. 22 means

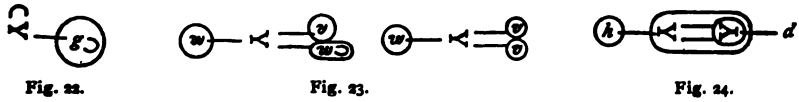

Fig. 22. Fig. 23. Fig. 24.

that taking any two things whatever, either the one is neither itself nor the other (putting it out of the question as an absurdity), or the other is a non-giver of something to that thing. That is, nothing gives all things, each to itself. Thus, the existence of any gen-

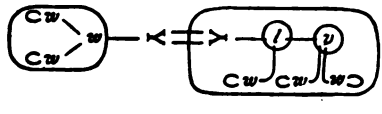

Fig. 25.

eral description of thing can be denied. Either medad of Fig. 23 means no wise men are virtuous. Fig. 24 is equivalent to Fig. 7. Fig. 25 means "each wise man is a lover of something virtuous."

Thus we see that this mode of junction,—lover of some virtuous,—which seems so simple,—is really complex. Fig. 26 means "some

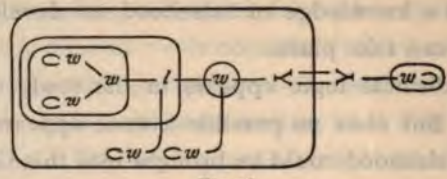

Fig. 26.

one thing is loved by all wise men." Fig. 27 means that every man is either wise or virtuous. Fig. 28 means that every man is both wise and virtuous.

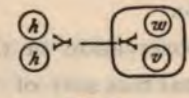

Fig. 27.

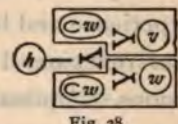

Fig. 28.

These explanations need not be carried further to show that we have here a perfectly efficient and highly analytical method of representing relations.

§ 7. *The Algebra of Dyadic Relatives.*—Although the primitive relatives are triadic, yet they may be represented with but little violence by means of dyadic relatives, provided we allow several attachments to one blank. For instance, A gives B to C, may be represented by saying A is the first party in the transaction D, B is subject of D, C is second party of D, D is a giving by the first party of the subject to the second party. Triadic relatives cannot conveniently be represented on one line of writing. These considerations led me to invent the algebra of dyadic relatives as a tolerably convenient substitute in many cases for the graphical method of representation. In place of the one "operation," or mode of conjunction of graphical method, there are in this algebra four operations.

For the purpose of this algebra, I entirely discard the idea that every compound relative consists of an antecedent and a consequent part. I consider the circle round the antecedent as a mere sign of negation, for which in the algebra I substitute an *obelus* over that antecedent. The line between antecedent and consequent, I

treat as a sign of an "operation" by itself. It signifies that anything whatever being taken as correlate of the first written member,—antecedent or consequent,—and as first relate of the second written member, either the one or the other is to be accepted. Thus in place of the relative of Fig. 29 signifying that "taking anything whatever, M, either—is not a lover of M, or M is a benefactor of ——," that is "— is a lover only of a benefactor of —," I write

$$l \mathfrak{J} b.$$

Or if it happens to be read the other way, putting a short mark over any letters to signify that relate and correlate are interchanged, I write the same thing

$$\breve{b} \mathfrak{J} \breve{l}.$$

This operation, which may, at need, be denoted by a dagger in print, to which I give a scorpion-tail curve in its cursive form, I call *relative addition.*

The relative "— stands to everything which is a benefactor of — in the relation of servant of every lover of his," shows,

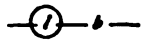

Fig. 29.

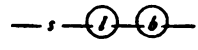

Fig. 30.

as written in Fig. 30, an unencircled bond between s and l. The junction of the l and the b may therefore be regarded as direct. Stating the relative so as to make this direct junction prominent, it is "— is servant of everything that is a lover of a benefactor of —." In the algebra, as far as already explained, "lover of a benefactor" would be written

$$\overline{l \mathfrak{J} \bar{b}}$$

that is, not a non-lover of every benefactor, or not a lover only of non-benefactors. This mode of junction, I call, in the algebra, the operation of *relative multiplication*, and write it

$$l b.$$

We have, then, the purely formal, or meaningless, equation

$$l b = \overline{l \mathfrak{J} \bar{b}}.$$

And in like manner, as a consequence of this,

$$l \mathfrak{J} b = \overline{l \bar{b}}.$$

That is to say, "To say that A is a lover of everything but benefactors of B," or "A is a non-lover only of benefactors of B," is the same as to say that A is not a non-lover of a non-benefactor of B.

To express in the algebra the relative of Fig. 31

Fig. 31.

or "— is both a lover and a benefactor of —," I write

$$l \cdot b,$$

calling this "the operation of *non-relative multiplication.*" To express "— is either a lover or a benefactor of —," which might be written

$$\overline{\overline{l} \cdot \overline{b}},$$

I write

$$l + b,$$

calling this the operation of *non-relative addition*, or more accurately, of *aggregation.* These last two operations belong to the Boolian algebra of non-relative logic. They are De Morgan's operations of composition and aggregation. Boole himself did not use the last, but in place of it an operation more properly termed addition which gives no interpretable result when the aggregants have any common aggregant. Mr. Venn still holds out for Boole's operation, and there are weighty considerations in its favor. In my opinion, the decision between the two operations should depend upon whether the quantified predicate is rejected (when aggregation should be used), or accepted (when Boole's strict addition should be used).

The use of these four operations necessitates continual resort to parentheses, brackets, and braces to show how far the different compound relatives extend. It also becomes desirable to have a "copula of inclusion," or the sign of "is exclusively (if anything)." For this purpose I have since 1870 employed the sign $-<$ (intended for an improved $\leq$). It is easily made in the composing room from a dash followed by $<$, and in its cursive form is struck off in

two rapid strokes, thus $\prec$. Its meaning is exemplified in the formula

$$w \prec v$$

"anybody who is wise (if any there be) is exclusively found among the virtuous." We also require in this algebra the signs of relatives of second intention

0, "— is inconsistent with —," ∞, "— is coexistent with —,"
T, "— is other than —," I, "— is identical with."

The algebra has a moderate amount of power in skilful hands; but its great defect is the vast multitude of purely formal propositions which it brings along. The most significant of these are

$$s(l \mathfrak{J} b) \prec s l \mathfrak{J} b$$

and

$$(l \mathfrak{J} b)s \prec l \mathfrak{J} bs.$$

That is, whatever is a servant of something which is a lover of everything but benefactors is a servant-of-a-lover to everything but benefactors, etc.

Professor Schröder attaches, as it seems to me, too high a value to this algebra. That which is in his eyes the greatest recommendation of it is to me scarcely a merit, namely that it enables us to express in the outward guise of an equation propositions whose real meaning is much simpler than that of an equation.

§ 8. *General algebra of logic.*—Besides the algebra just described, I have invented another which seems to me much more valuable. It expresses with the utmost facility everything which can be expressed by a graph, and frequently much more clearly than the unabridged graphs described above. The method of using it in the solution of special problems has also been fully developed by me.

In this algebra every proposition consists of two parts, its quantifiers and its Boolian. The Boolian consists of a number of relatives united by a non-relative multiplication and aggregation. No relative operations are required (though they can be introduced if desired). Each elementary relative is represented by a letter on the line of writing with subjacent indices to denote the hecceities

which fill its blanks. An obelus is drawn over such a relative to deny it.

To the left of the Boolian are written the quantifiers. Each of these is a Π or a Σ with one of the indices written subjacent to it, to signify that in the Boolian every object in the universe is to be imaged substituted successively for that index and the non-relative product (if the quantifier is Π) or the aggregate (if the quantifier is Σ) of the results taken. The order of the quantifiers is, of course, material. Thus

$$\Pi_i \Sigma_j l_{ij} = (l_{11} \dagger l_{12} \dagger l_{13} \dagger \text{etc.}) \cdot (l_{21} \dagger l_{22} \dagger l_{23} \dagger \text{etc.}) \cdot \text{etc.}$$

will mean anything loves something. But

$$\Sigma_j \Pi_i l_{ij} = l_{11} \cdot l_{21} \cdot l_{31} \cdot \text{etc.} \dagger l_{12} \cdot l_{22} \cdot l_{32} \cdot \text{etc.} \dagger l_{13} \cdot l_{23} \cdot l_{33} \cdot \text{etc.} \dagger \text{etc.}$$

will mean something is loved by all things.

This algebra, which has but two operations, and those easily manageable, is, in my opinion, the most convenient apparatus for the study of difficult logical problems, although the graphical method is capable of such modification as to render it substantially as convenient on the average. Nor would I refuse to avail myself of the algebra of dyadic relatives in the simpler cases in which it is easily handled.

§ 9. *Method of Calculating with the General Algebra.*—My rules for working this algebra, the fruit of long experience with applying it to a great variety of genuine inquiries, have never been published. Nor can I here do more than state such as the beginner will be likely to require.

A number of premises being given, it is required to know the most important conclusions of a certain description which can be drawn from them. The first step will be to express the premises by means of the general algebra, taking care to use entirely different letters *as indices* in the different premises.

These premises are then to be copulated (or, in Whewell's phrase, colligated), i. e., non-relatively multiplied together, by multiplying their Boolians and writing before the product all the quantifiers. The relative order of the quantifiers of each premise

must (in general) be undisturbed; but the relative order of quantifiers of different premises is arbitrary. The student ought to place Σ's as far to the left and Π's as far to the right as possible. Different arrangements of the quantifiers will lead to different conclusions from the premises. It sometimes happens that each of several arrangements leads to a conclusion which could not easily be reached from any other arrangement.

The premises, being so copulated, become one copulated premise. This copulated premise is next to be logically multiplied into itself any number of times, the indices being different in all the different factors. For there will be certain conclusions which I call conclusions of the first order, which can be drawn from the copulated premise without such involution, certain others, which I call inferences of the second order, which can be drawn from its square, etc. But after involution has been carried to a certain point, higher powers will only lead to inferences of subsidiary importance. The student will get a just idea of this matter by considering the rise and decline of interest in the theorems of any mathematical theory, such as geometry or the theory of numbers, as the fundamental hypotheses are applied more and more times in the demonstrations. The number of factors in the copulated premise, which embraces *all* the hypotheses that either theory assumes, is not great. Yet from this premise many thousand conclusions have already been drawn in the case of geometry and hundreds in the case of the theory of numbers. New conclusions are now coming in faster than ever before. From the nature of logic they can never be exhausted. But as time goes on the conclusions become more special and less important. It is true that mathematics, as a whole, does not become more special nor its late discoveries less important, because there is a growth of the hypotheses. Up to a certain degree, the importance of the conclusions increases with their "order." Thus, in geometry, there is nothing worth mention of the first order, and hardly of the second. But there is a great falling off in the importance of conclusions in the theories mentioned long before the fiftieth order has been reached.

This involution having been performed, the next step will be

the identification (occasionally the diversification) of certain indices. The rule is, that any index quantified with a Π can be transmitted, throughout the Boolian, into any other index whose quantifier stands to the left of its own, which now becomes useless, since it refers to nothing in the Boolian. For example, in

$$\Sigma_i \Pi_j l_{ij}$$

which in the Algebra of Dyadic Relatives would be written $\infty(l \mathfrak{J} 0)$, we can identify $\mathfrak{J}$ with i and write

$$\Sigma_i l_{ii}$$

which in the other algebra becomes $\infty(l \cdot \mathsf{I})\infty$.

That done, the Boolian is to be manipulated according to any of the methods of non-relative Boolian algebra, and the conclusion is read off.

But it is only in the simplest cases that the above operations suffice. Relatives of second intention will often have to be introduced; and their peculiar properties must be attended to. Those of 0 and ∞ are covered by the rules of non-relative Boolian algebra; but it is not so with I and T. We have, for example, to observe that

$$\Pi_i x_i \dagger y_i = \Pi_i \Pi_j x_i \dagger \mathsf{T}_{ij} \dagger y_i .$$
$$\Sigma_i x_i \cdot y_i = \Sigma_i \Sigma_j x_i \cdot \mathsf{I}_{ij} \cdot y_j .$$

Exceedingly important are the relatives signifying "— is a quality of —" and "— is a relation of — to —." It may be said that mathematical reasoning (which is the only deductive reasoning, if not absolutely, at least eminently) almost entirely turns on the consideration of abstractions as if they were objects. The protest of nominalism against such hypostatisation, although, if it knew how to formulate itself, it would be justified as against much of the empty disputation of the medieval Dunces, yet, as it was and is formulated, is simply a protest against the only kind of thinking that has ever advanced human culture. Nobody will work long with the logic of relatives,—unless he restricts the problems of his studies very much,—without seeing that this is true.

§ 10. *Schröder's Conception of Logical Problems.*.—Of my own labors in the logic of relatives since my last publication in 1884, I intend to give a slight hint in § 13. But I desire to give some idea

of a part of the contents of Schröder's last volume. In doing so, I shall adhere to my own notation; for I cannot accept Professor Schröder's proposed innovations. I shall give my reasons in detail for this dissent in the *Bulletin of the American Mathematical Society*. I will here only indicate their general nature. I have no objection whatever to the creation of a new system of signs *ab ovo*, if anybody can propose such a system sufficiently recommending itself. But *that* Professor Schröder does not attempt. He wishes his notation to have the support of existing habits and conventions, while proposing a measure of reform in the present usage. For that he must obtain general consent. Now it seems to me quite certain that no such general agreement can be obtained without the strictest deference to the principle of priority. Without that, new notations can only lead to confusion thrice confounded. The experience of biologists in regard to the nomenclature of their genera and other groups shows that this is so. I believe that their experience shows that the only way to secure uniformity in regard to conventions of this sort, is to accept for each operation and relative the sign definitively recommended by the person who introduced that operation or relative into the Boolian algebra, unless there are the most *substantial* reasons for dissatisfaction with the meaning of the sign. Objections of lesser magnitude may justify slight modifications of signs; as I modify Jevons's $+$ to $\boldsymbol{+}$, by uniting the two dots by a connecting line, and as I so far yield to Schröder's objections to using $\propto$ for the sign of whatever is, as to resort to the similarly shaped sign of Aries ♈ (especially as a notation of some power is obtained by using all the signs of the Zodiac in the same sense, as I shall show elsewhere). In my opinion, Professor Schröder alleges no sufficient reason for a single one of his innovations; and I further consider them as *positively* objectionable.

The volume consists of thirty-one long sections filling six hundred and fifty pages. I can, therefore, not attempt to do more than to exemplify its contents by specimens of the work selected as particularly interesting. Professor Schröder chiefly occupies himself with what he calls "solution-problems," in which it is required to deduce from a given proposition an *equation* of which one mem-

ber consists in a certain relative determined in advance, while the other member shall not contain that relative. He rightly remarks that such problems often involve problems of elimination.

While I am not at all disposed to deny that the so-called "solution-problems," consisting in the ascertainment of the general forms of relatives which satisfy given conditions, are often of considerable importance, I cannot admit that the interest of logical study centres in them. I hold that it is usually much more to the purpose to express in the simplest way what a given premise discloses in regard to the constitution of a relative, whether that simplest expression is of the nature of an equation or not. Thus, one of Schröder's problems is, "Given $x \prec a$, required x,"—for instance, knowing that an opossum is a marsupial, give a description of the opossum. The so-called solution is $\sum_u = x u \cdot a$, or opossums embrace precisely what is common to marsupials and to some other class. In my judgment $x \prec a$ might with great propriety be called the solution of $\sum_u = x u \cdot a$. When the information contained in a proposition is not of the nature of an equation, why should we, by circumlocutions, insist upon expressing it in the form of an equation?

Professor Schröder attaches great importance to the generality of solutions. In my opinion, this is a mistake. It is not merely that he insists that solutions shall be *complete*, as for example when we require *every root* of a numerical equation, but further that they shall all be embraced under one algebraical expression. Upon that he insists and with that he is satisfied. Whether or not the "solution" is such as to exhibit anything of the real constitution of the relative which forms the first member of the equation he does not seem to care; at least, there is no apparent consideration of the question of how such a result can be secured.

Pure mathematics always selects for the subjects of its studies manifolds of perfect homogeneity; and thence it comes that for the problems which first present themselves general solutions are possible, which notwithstanding their generality, guide us at once to all the particular solutions. But even in pure mathematics the class of problems which are capable of solutions at once general

and useful is an exceedingly limited one. All others have to be treated by subdivision of cases. That is what meets us everywhere in higher algebra. As for general solutions, they are for the most part trivial,—like the well-known and obvious test for a prime number that the continued product of all lesser numbers increased by 1 shall be divisible by that number. Only in those cases in which a general solution points the way to the particular solutions is it valuable; for it is only the particular solutions which picture to the mind the solution of a problem; and a form of words which fails to produce a definite picture in the mind is meaningless.

Professor Schröder endeavors to give the most general formula of a logical problem. It is in dealing with such very general and fundamental matters that the exact logician is most in danger of violating his own principles of exactitude. To seek a formula for all logical problems is to ask what it is, in general terms, that men inquire. To answer that question, my own logical proceeding would be to note that it asks what the essence of a question, in general, is. Now a question is a rational contrivance or device, and in order to understand any rational contrivance, experience shows that the best way is to begin by considering what circumstances of need prompted the contrivance, and then upon what general principle its action is designed to fill that need. Applying this general experience to the case before us, we remark that every question is prompted by some need,—that is, by some unsatisfactory condition of things, and that the object of asking the question is to fill that need by bringing reason to bear upon it and to do this by a hypnotically suggestive indication of that to which the mind has to apply itself. I do not know that I have ever, before this minute, considered the question what is the most general formulation of a problem in general; for I do not find much virtue in general formulæ. Nor do I think my answer to this question affords any particularly precious suggestion. But its ordinary character makes it all the better an illustration of the manner—or one of the manners—in which an exact logician may attack, off-hand, a suddenly sprung question. A question, I say, is an indication suggestive (in the hypnotic sense) of what has to be thought about in order to satisfy

some more or less pressing want. Ideas like those of this statement, and not talk about φx, and "roots," and the like, must, in my opinion, form the staple of a logical analysis and useful description of a problem, in general. I am none the less a mathematical logician for that. If of two students of the theory of numbers one should insist upon considering numbers as expressed in a system of notation like the Arabic (though using now one number as base of the numeration, and now another), while the other student should maintain that all that was foreign to the theory of numbers, which ought not to consider upon what system the numbers with which it deals are expressed, those two students would, to my apprehension, occupy positions analogous to that of Schröder and mine in regard to this matter of the formulation of the problems of logic; and supposing the student who wished to consider the forms of expression of numbers were to accuse the other of being wanting in the spirit of an arithmetician, that charge would be unjust in quite the same way in which it would be unjust to charge me with deficiency in the mathematical spirit on account of my regarding the conceptions of "values," and "roots," and all that as very special ideas, which can only lumber up the field of consciousness with such hindrances as it is the very end and aim of that diagrammatic method of thinking that characterises the mathematician to get rid of.

But different questions are so very unlike that the only way to get much idea of the nature of a problem is to consider the different cases separately. There are in the first place questions about needs and their fulfillment which are not directly affected by the asking of the questions. A very good example is a chess problem. You have only to experiment in the imagination just as you would do on the board if it were permitted to touch the men, and if your experiments are intelligently conducted and are carried far enough, the solution required must be discovered. In other cases, the need to which the question relates is nothing but the intellectual need of having that question answered. It may happen that questions of this kind can likewise be answered by imaginary experimentation; but the more usual case requires real experimentation. The need

is of one or other of two kinds. In the one class of cases we experience on several occasions to which our own deliberate action gave a common character, an excitation of one and the same novel idea or sensation, and the need is that a large number of propositions having the same novel consequent but different antecedents, should be replaced by one proposition which brings in the novel element, so that the others shall appear as mere consequences of every day facts with a single novel one. We may express this intellectual need in a brief phrase as the need of synthetising a multitude of subjects. It is the need of *generalisation*. In another class of cases, we find in some new thing, or new situation, a great number of characters, the same as would naturally present themselves as consequences of a hypothetical state of things, and the need is that the large number of novel propositions with one subject or antecedent should be replaced by a single novel proposition, namely that the new thing or new occasion belongs to the hypothetical class, from which all those other novelties shall follow as mere consequences of matters of course. This intellectual need, briefly stated, is the need of synthetising a multitude of predicates. It is the need of *theory*. Every problem, then, is either a problem of consequences, a problem of generalisation, or a problem of theory. This statement illustrates how special solutions are the only ones which directly mean anything or embody any knowledge; and general solutions are only useful when they happen to suggest what the special solutions will be.

Professor Schröder entertains very different ideas upon these matters. The general problem, according to him, is, "Given the proposition $Fx = 0$, required the 'value' of x_0," that is, an expression not containing x which can be equated to x. This 'value' must be the "general root," that is, it must, under one general description, cover every possible object which fulfils a given condition. This, by the way, is the simplest explanation of what Schröder means by a "solution-problem"; it is the problem to find that form of relative which necessarily fulfils a given condition and in which every relative that fulfils that condition can be expressed. Schröder shows that the solution of such a problem can be put into

the form $\sum_u [x = fu]$, which means that a suitable logical function (f) of *any* relative, u, no matter what, will satisfy the condition $Fx = 0$; and that nothing which is not equivalent to such a function will satisfy that condition. He further shows, what is very significant, that the solution may be required to satisfy the "adventitious condition" $fx = x$. This fact about the adventitious condition is all that prevents me from rating the value of the whole discussion as far from high.

Professor Schröder next produces what he calls "the rigorous solution" of the general question. This promises something very fine,—the rigorously correct resolution of everything that ever could (but for this knowledge) puzzle the human mind. It is true that it supposes that a particular relative has been found which shall satisfy the condition $Fx = 0$. But that is seldom difficult to find. Either 0, or ∞, or some other trivial solution commonly offers itself. Supposing, then, that a be this particular solution, that is, that $Fa = 0$, the "rigorous solution" is

$$x = fu = a \cdot \infty (Fu) \infty + u \cdot (0 \mathrel{\text{ʒ}} \overline{Fu} \mathrel{\text{ʒ}} 0).$$

That is, it is such a function of u that when u satisfies the condition $Fu = 0$, $fu = u$; but when u does not satisfy this condition $fu = a$. Now $Fa = 0$.

Since Professor Schröder carries his algebraicity so very far and talks of "roots," "values," "solutions," etc., when, even in my opinion, with my bias towards algebra, such phrases are out of place, let us see how this "rigorous solution" would stand the climate of numerical algebra. What should we say of a man who professed to give rigorous general solutions of algebraic equations of every degree (a problem included, of course, under Professor Schröder's general problem)? Take the equation $x^5 + Ax^4 + Bx^3 + Cx^2 + Dx + E = 0$. Multiplying by $x - a$ we get

$$x^6 + (A - a)x^5 + (B - aA)x^4 + (C - aB)x^3 + (D - aC)x^2 + (E - aD)x - aE = 0$$

The roots of this equation are precisely the same as those of the proposed quintic together with the additional root $x = a$. Hence, if we solve the sectic we thereby solve the quintic. Now, our

Schröderian solver would say, "There is a certain function, fu, every value of which, no matter what be the value of the variable, is a root of the sextic. And this function is formed by a direct operation. Namely, for all values of u which satisfy the equation

$$u^6+(A-a)u^5+(B-aA)u^4+(C-aB)u^3+(D-aC)u^2+(E-aD)u-aE=0$$

$fu=u$, while for all other values, $fu=a$.

Then, $x=fu$ is the expression of every root of the sextic and of nothing else. It is safe to say that Professor Schröder would pronounce a pretender to algebraical power who should talk in that fashion to be a proper subject for *surveillance* if not for confinement in an asylum. Yet he would only be applying Professor Schröder's "rigorous solution," neither more nor less. It is true that Schröder considers this solution as somewhat unsatisfactory; but he fails to state any principle according to which it should be so. Nor does he hold it too unsatisfactory to be frequently resorted to in the course of the volume. The *invention* of this solution exhibits in a high degree that very effective ingenuity which the *solution itself* so utterly lacks, owing to its resting on no correct conception of the nature of problems in general and of their solutions and of the meaning of a proposition.

§ 11. *Professor Schröder's Pentagrammatical Notation.*—Professor Schröder's greatest success in the logic of relatives, is due precisely to his having, in regard to certain questions, proceeded by the separation of cases, quite abandoning the glittering generalities of the algebra of dyadic relatives. As his greatest success, I reckon his solutions of "inverse row and column problems" in § 16, resting upon an investigation in § 15 of the relations of various compound relatives which end in 0, ∞, 1, and T. The investigations of § 15 might perfectly well have been carried through without any other instrument than the algebra of dyadic relatives. This course would have had certain advantages, such as that of exhibiting the principles on which the formulæ rest. But directness of proof would not have been of the number of those advantages; this is on the contrary decidedly with the notation invented and used by Professor Schröder. This notation may be called *pentagrammatic*, since it

denotes a relative by a row of 5 characters. Imagine a list to be made of all the objects in the universe. Second, imagine a switchboard, consisting of a horizontal strip of brass for each object (these strips being fastened on a wall at a little distance one over another according to the order of the objects in the list) together with a vertical strip of brass for each object (these strips being fastened a little forward of the others, and being arranged in the same order), with holes at all the intersections, so that when a brass plug is inserted in any hole, the object corresponding to the horizontal brass strip can act in some way upon the object corresponding to the vertical brass strip. In order then, by means of this switchboard, to get an analogue of any dyadic relative, a lover of —," we insert plugs so that A and B, being any two objects, A can act on B, if and only if A is a lover of B. Now in Professor Schröder's pentagrammatic notation, the first of the five characters denoting any logical function of a primitive relative, a, refers to those horizontal strips, all whose holes are plugged in the representation of a (or, as we may say for short, "in a"), the second refers to those horizontal strips, each of which has in a every hole plugged but one. This one, not necessarily the same for all such strips, may be denoted by A. The third character refers to those horizontal strips which in a have several holes plugged, and several empty. The full holes (different, it may be, in the different horizontal strips) may be denoted by β. The fourth character refers to those horizontal strips which in a have, each of them, but one hole plugged, generally a different hole in each. This one plugged hole may be denoted by Γ. The fifth character will refer to those rows each of which in a has all its holes empty. Then, a will be denoted by $\varphi\,\bar{\mathrm{A}}\,\beta\,\Gamma\,0$; and $\bar{a}$ by $0\,\mathrm{A}\,\bar{\beta}\,\bar{\Gamma}\,\varphi$; for in $\bar{a}$, all the holes must be filled that are void in a, and *vice versa*. Consequently $\bar{a}\,\mathrm{T} = 0\,\bar{\mathrm{A}}\,\varphi\,\varphi\,\varphi$. This shall be shown as soon as we have first examined the pentagrammatic symbol for a. This symbol divides a into four aggregants, viz:

$$a = (a \mathbin{\text{⅄}} 0) \mathbin{+\!\!\!\!\!\!\;\;\;\;} a \cdot [(a \mathbin{\text{⅄}} 1) \cdot \bar{a}]\,\mathrm{T} \mathbin{+\!\!\!\!\!\!\;\;\;\;} a \cdot a\,\mathrm{T} \cdot (\bar{a} \cdot \bar{a}\,\mathrm{T})\,\mathrm{T} \mathbin{+\!\!\!\!\!\!\;\;\;\;} a \cdot (\bar{a} \mathbin{\text{⅄}} 1)$$

In order to prove, by the algebra itself that this equation holds, we remark that $a = a \cdot b \mathbin{+\!\!\!\!\!\!\;\;\;\;} a \cdot \bar{b}$, whatever b may be. For b, substitute

$(a \mathbin{\mathfrak{J}} 0)$. Then, $a \mathbin{\mathfrak{J}} 0 \prec a \mathbin{\mathfrak{J}} \mathsf{T}$; but $a \mathbin{\mathfrak{J}} \mathsf{T} = a$. Hence, $a \cdot b = a \mathbin{\mathfrak{J}} 0$. $a \cdot \bar{b} = a \cdot \bar{a}^{\wp} = a \cdot \bar{a}(\mathsf{I} \dagger \mathsf{T}) = a \cdot (\bar{a}\mathsf{I} \dagger \bar{a}\mathsf{T})$. But $\bar{a}\mathsf{I} = \bar{a}$, and $a \cdot \bar{a} = 0$. Hence $a \cdot \bar{b} = a \cdot \bar{a}\mathsf{T}$. Thus $a = a \mathbin{\mathfrak{J}} 0 \dagger a \cdot \bar{a}\mathsf{T}$. Now, in $\bar{a} = \bar{a} \cdot c \dagger \bar{a} \cdot \bar{c}$, substitute for c, $a \mathbin{\mathfrak{J}} \mathsf{I}$. This gives $\bar{a} = (a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a} \dagger \bar{a}\mathsf{T} \cdot \bar{a}$; and thus, $a = a \mathbin{\mathfrak{J}} 0 \dagger a \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \dagger a \cdot (\bar{a}\mathsf{T} \cdot \bar{a})\mathsf{T}$. Finally, $a = a \cdot a\mathsf{T} \dagger a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I})$. But $a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) = a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (\bar{a}\mathsf{T} \cdot \bar{a})\mathsf{T} \dagger a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \{[(a \mathbin{\mathfrak{J}} \mathsf{I}) \dagger a] \mathbin{\mathfrak{J}} \mathsf{I}\}$.

And

$$
\begin{aligned}
a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \{[(a \mathbin{\mathfrak{J}} \mathsf{I}) \dagger a] \mathbin{\mathfrak{J}} \mathsf{I}\} &= a \cdot \{\bar{a} \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \dagger a] \mathbin{\mathfrak{J}} \mathsf{I}\} && \text{(by distribution)} \\
&= a \cdot [\bar{a} \cdot (a \mathbin{\mathfrak{J}} \mathsf{I}) \mathbin{\mathfrak{J}} \mathsf{I}] && \text{(since } \bar{a} \cdot a = 0) \\
&= a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} \mathsf{I} \mathbin{\mathfrak{J}} \mathsf{I}) && \text{(by distribution)} \\
&= a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} 0) && \text{(if more than 2 things exist)} \\
&= a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} \mathsf{I} \cdot \mathsf{T}) && \text{(since } 0 = \mathsf{I} \cdot \mathsf{T}) \\
&= a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} \mathsf{T}) && \text{(by distribution)} \\
&= a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (a \mathbin{\mathfrak{J}} \mathsf{I}) && \text{(since } a \mathbin{\mathfrak{J}} \mathsf{T} = a) \\
&= a \cdot (\bar{a} \cdot a \mathbin{\mathfrak{J}} \mathsf{I}) && \text{(by distribution)} \\
&= a \cdot (0 \mathbin{\mathfrak{J}} \mathsf{I}) && \text{(since } \bar{a} \cdot a = 0) \\
&= a \cdot 0 && \text{(if more than 1 object exists)} \\
&= 0.
\end{aligned}
$$

So that $a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) = a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (\bar{a}\mathsf{T} \cdot \bar{a})\mathsf{T}$ and thus

$$a = a \mathbin{\mathfrak{J}} 0 \dagger a \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \dagger a \cdot a\mathsf{T}(\bar{a}\mathsf{T} \cdot \bar{a})\mathsf{T} \dagger a \cdot (\bar{a} \mathbin{\mathfrak{J}} \mathsf{I}).$$

This is the meaning of the symbol $\wp \bar{\mathrm{A}} \beta \Gamma 0$.

We, now, at length, return, as promised to the examination of $\bar{a}\mathsf{T}$. First, $a \mathbin{\mathfrak{J}} 0 \prec \overline{\bar{a}\mathsf{T}} \mathbin{\mathfrak{J}} 0$. For $\overline{\bar{a}\mathsf{T}} = a \mathbin{\mathfrak{J}} \mathsf{I}$ and $a \mathbin{\mathfrak{J}} \mathsf{I} \mathbin{\mathfrak{J}} 0 = a \mathbin{\mathfrak{J}} (\mathsf{I} \mathbin{\mathfrak{J}} 0) = a \mathbin{\mathfrak{J}} 0$. Hence the first character in the pentagrammatic symbol for $\bar{a}\mathsf{T}$ must be 0. Second $a \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \prec \bar{a}\mathsf{T} \cdot [(\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \overline{\bar{a}\mathsf{T}}]\mathsf{T}$. For it is plain that $a \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \prec [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \prec \bar{a}\mathsf{T}$. Also $\bar{a} \prec \bar{a}^{\wp} \prec \bar{a}(\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}) \prec \bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}$. Hence $[(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \prec [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I})]\mathsf{T}$. But $a \mathbin{\mathfrak{J}} \mathsf{I} = \overline{\bar{a}\mathsf{T}}$. Hence, $a \cdot [(a \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \bar{a}]\mathsf{T} \prec \bar{a}\mathsf{T} \cdot [(\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot \overline{\bar{a}\mathsf{T}}]\mathsf{T}$. Hence, the second character in the pentagrammatic sign for $\bar{a}\mathsf{T}$, is the same as that of a. Thirdly $a \cdot a\mathsf{T} \cdot (\bar{a}\mathsf{T} \cdot \bar{a})\mathsf{T} \prec \bar{a}\mathsf{T} \mathbin{\mathfrak{J}} 0$. For $\bar{a} \prec \bar{a}\mathsf{I} \prec \bar{a}(\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}) \prec \bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}$. Hence $(\bar{a} \cdot \bar{a}\mathsf{T})\mathsf{T} \prec [(\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I}) \cdot (\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{T})]\mathsf{T} \prec (\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} \mathsf{I} \cdot \mathsf{T})\mathsf{T} \prec (\bar{a}\mathsf{T} \mathbin{\mathfrak{J}} 0)\mathsf{T} \prec \bar{a}\mathsf{T} \mathbin{\mathfrak{J}} 0\mathsf{T} \prec \bar{a}\mathsf{T} \mathbin{\mathfrak{J}} 0$. Consequently, the third character of the pentagrammatic symbol of $\bar{a}\mathsf{T}$ must be $\wp$.

Fourthly, $a\cdot(\bar{a}\,\mathfrak{J}\,\mathsf{I})\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,0$. For we have just seen that $\bar{a}\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,\mathsf{I}$. Hence $\bar{a}\,\mathfrak{J}\,\mathsf{I}\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,\mathsf{I}\,\mathfrak{J}\,\mathsf{I}$. But $\mathsf{I}\,\mathfrak{J}\,\mathsf{I}=0$ if there is more than one object in the universe. Hence $\bar{a}\,\mathfrak{J}\,\mathsf{I}\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,0$. Consequently, the fourth character of the pentagrammatic formula for $\bar{a}\,\mathsf{T}$ is $\wp$. Finally, $\bar{a}\,\mathfrak{J}\,0\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,0$. For $\bar{a}\,\mathfrak{J}\,0\prec\bar{a}\,\mathfrak{J}\,0\,\mathfrak{J}\,0\prec\bar{a}\,\mathfrak{J}\,\mathsf{I}\cdot\mathsf{T}\,\mathfrak{J}\,0\prec(\bar{a}\,\mathfrak{J}\,\mathsf{I})\cdot(\bar{a}\,\mathfrak{J}\,\mathsf{T})\,\mathfrak{J}\,0\prec\bar{a}\,\mathfrak{J}\,\mathsf{I}\,\mathfrak{J}\,0\prec\bar{a}\,\mathsf{T}\,\mathfrak{J}\,0$. Hence the fifth character of the pentagram of $\bar{a}\,\mathsf{T}$ is $\wp$. In fine, that pentagram is $0\,\bar{\mathsf{A}}\,\wp\,\wp\,\wp$. Professor Schröder obtains this result more directly by means of a special calculus of the pentagrammatic notation. In that way, he obtains, in § 15, a vast number of formulæ, which in § 16 are applied in the first place with great success to the solution of such problems as this: Required a form of relation in which everything stands to something but nothing to everything. The author finds instantaneously that every relative signifying such a relation must be reducible to the form $\bar{u}^{\wp}\cdot u+\mathsf{I}\cdot(u\,\mathfrak{J}\,0+\bar{u}\,\mathfrak{J}\,0)$. In fact, the first term of this expression $\bar{u}^{\wp}\cdot u$, for which $\bar{u}^{\wp}\cdot u^{\wp}$ might as well be written, embraces all the relatives in question. For let $\bar{u}$ be any such relative. Then, $u=\bar{u}^{\wp}\cdot u$. The second term is added, curiously enough, merely to *exclude other relations*. For if u is such a relative that something is u to everything or to nothing, then that something would be in the relation $\bar{u}^{\wp}\cdot u$ to nothing. To give it a correlate the second term is added; and since all the relatives are already included, it matters not what that correlate be, so long as the second term does not exclude any of the required relatives which are included under the first term. Let v be any relative of the kind required, then $v\cdot(u\,\mathfrak{J}\,0+\bar{u}\,\mathfrak{J}\,0)$ will answer for the second term. If we had no letter expressing a relation known to be of the required kind, the problem would be impossible. Fortunately, both I and T are of that kind. Of course, the negative of such a relative is itself such a relative; so that

$$(u\,\mathfrak{J}\,0\,\bar{u}\,\mathfrak{J}\,0)\cdot(v+u^{\wp}\cdot\bar{u}^{\wp})$$

would be an equivalent form, equally with

$$(u\,\mathfrak{J}\,0+\bar{u}\,\mathfrak{J}\,0)\cdot v+u^{\wp}\cdot\bar{u}^{\wp}.$$

§ 16 concludes with some examples of eliminations of great apparent complexity. In the first of these we have given $x=$

$(\bar{u} \mathrel{\mathfrak{J}} 1)^{\infty} \mathrel{+} u$; and it is required to eliminate u. We have, however, instantly $u \prec x$

$$(\bar{u} \mathrel{\mathfrak{J}} 1)^{\infty} \prec x$$

Whence, immediately,

$$(\bar{x} \mathrel{\mathfrak{J}} 1)^{\infty} \prec x,$$

or

$$^{\infty} \prec (x \cdot x \mathrm{T})^{\infty}.$$

The next example, the most complicated, requires u to be eliminated from the equation

$$x = \bar{u} \mathrel{\mathfrak{J}} 0 \mathrel{+} (u \mathrel{\mathfrak{J}} 1)^{\infty} \cdot \bar{u} \mathrm{T} \mathrel{+} (u \mathrel{\mathfrak{J}} 1) \cdot \bar{u} \mathrel{+} (\bar{u} \mathrel{\mathfrak{J}} 1) \cdot u \mathrel{+} (u \mathrm{T} \cdot \bar{u} \mathrm{T} \mathrel{\mathfrak{J}} 0) \cdot \bar{u},$$

He performs the elimination by means of the pentagrammatic notation very easily as follows: Putting $u = {}^{\infty}\bar{\mathrm{A}}\beta\Gamma 0$

$$\begin{array}{rl}
\bar{u} \mathrel{\mathfrak{J}} 0 & = 0\,0\,0\,0^{\infty} \\
(u \mathrel{\mathfrak{J}} 1)^{\infty} \cdot \bar{u} \mathrm{T} & = 0\,\bar{\mathrm{A}}\,0\,0\,0 \\
(u \mathrel{\mathfrak{J}} 1) \cdot \bar{u} & = 0\,\mathrm{A}\,0\,0\,0 \\
(\bar{u} \mathrel{\mathfrak{J}} 1) \cdot u & = 0\,0\,0\,\Gamma\,0 \\
(u \mathrm{T} \cdot \bar{u} \mathrm{T} \mathrel{\mathfrak{J}} 0) \cdot \bar{u} & = 0\,0\,\bar{\beta}\,0\,0 \\
\hline
\text{sum} & 0^{\infty}\,\bar{\beta}\,\Gamma^{\infty}
\end{array}$$

Thus, x is of the form ${}^{\infty}\text{-}\beta\Gamma 0$, which has been found in former problems to imply $x \mathrel{\mathfrak{J}} 1 \prec x$.

Without the pentagrammatical notation this elimination would prove troublesome, although with that as a guide it could easily be obtained by the algebra alone.

§ 12. *Professor Schröder's Iconic Solution of* $x \prec \varphi x$.

Another valuable result obtained by Professor Schröder is the solutions of the problem

$$x \prec \varphi x.$$

Namely, he shows that

$$x = f^{\infty} u$$

where

$$fu = u \cdot \varphi u$$

[Of course, by contraposition, this gives for the solution of $\varphi x \prec x$ $x = f^{\infty} u$ where $fu = u \mathrel{+} \varphi u$.] The correctness of this solution will appear upon a moment's reflexion; and nearly all the useful solutions in the volume are cases under this.

It happens very frequently that the iteration of the functional operation is unnecessary, because it has no effect.

Suppose, for example, that we desire the general form of a "transitive" relative, that is, such a one, x, that

$$x\,x \prec x.$$

In this case, since $1 \prec l \mathbin{\mathfrak{J}} \breve{l}$ whatever l may be, we have

$$x \prec x\,1 \prec x\,(x \mathbin{\mathfrak{J}} \breve{x}) \prec x\,x \mathbin{\mathfrak{J}} \breve{x} \prec x \mathbin{\mathfrak{J}} \breve{x},$$

or

$$x \prec x \mathbin{\mathfrak{J}} \breve{x}$$

If, then,

$$fu = u \cdot (u \mathbin{\mathfrak{J}} \breve{u}),$$

we have

$$x = f^{\infty} u.$$

Here,

$$fu \prec u;$$

so that

$$f^{\infty} u \prec fu.$$

Also,

$$f^2 u = fu \cdot (fu \mathbin{\mathfrak{J}} \breve{\overline{fu}}) = u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot [u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \mathbin{\mathfrak{J}} (\breve{u} + u\breve{u})]$$
$$= u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot [uf(1 + u)\breve{u}] \cdot [u \mathbin{\mathfrak{J}} \breve{u} \mathbin{\mathfrak{J}} (1 + u)\breve{u}].$$

Now

$$fu = u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) = u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot (u \mathbin{\mathfrak{J}} \breve{u}) = u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot (u \mathbin{\mathfrak{J}} 1\breve{u}) \cdot (u \mathbin{\mathfrak{J}} 1\breve{u})$$
$$\prec u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot [u \mathbin{\mathfrak{J}} (1 + u)\breve{u}] \cdot [u \mathbin{\mathfrak{J}} (\breve{u} \mathbin{\mathfrak{J}} u)\breve{u}] \prec$$
$$\prec u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot [u \mathbin{\mathfrak{J}} (1 + u)\breve{u}] \cdot (u \mathbin{\mathfrak{J}} \breve{u} \mathbin{\mathfrak{J}} u\breve{u})$$
$$\prec u \cdot (u \mathbin{\mathfrak{J}} \breve{u}) \cdot [u \mathbin{\mathfrak{J}} (1 + u)\breve{u}] \cdot [u \mathbin{\mathfrak{J}} \breve{u} \mathbin{\mathfrak{J}} (1 + u)\breve{u}] \prec f^2 u.$$

Thus $fu = f^{\infty} u$; and

$$x = \sum_{u} u \cdot (u \mathbin{\mathfrak{J}} \breve{u})$$

This is a truly iconic result; that is, it shows us what the constitution of a transitive relative really is. It shows us that transitiveness always depends upon inclusion; for to say that A is $l \mathbin{\mathfrak{J}} \breve{l}$ of B is to say that the things loved by B are included among those loved by A. The factor $u \mathbin{\mathfrak{J}} \breve{u}$ is transitive by itself; for

$$(u \mathbin{\mathfrak{J}} \breve{u})(u \mathbin{\mathfrak{J}} \breve{u}) \prec u \mathbin{\mathfrak{J}} \breve{u}\,u \mathbin{\mathfrak{J}} \breve{u} \prec u \mathbin{\mathfrak{J}} \top \mathbin{\mathfrak{J}} \breve{u} \prec u \mathbin{\mathfrak{J}} \breve{u}.$$

The effect of the other factor, u, of the form for the general transitive is merely in certain cases to exclude universal identity, and

thus to extend the class of relatives represented by $u \mathfrak{J} \breve{u}$ so as to include those of which it is not true that $1 \prec x$. Here we have an instance of restriction having the effect of extension, that is, restriction of special relatives extends the class of relatives represented. This does not take place in all cases, but only where certain relatives can be represented in more than one way.

Indicating, for a moment, the copula by a dash, the typical and fundamental syllogism is

$$\begin{array}{l} A—B \quad B—C \\ \therefore A—C. \end{array}$$

That is to say, the principle of this syllogism enters into every syllogism. But to say that this is a valid syllogism is merely to say that the copula expresses a transitive relation. Hence, when we now find that transitiveness always depends upon inclusion, the initial analysis by which the copula of inclusion was taken as the general one is fully confirmed. For the chief end of formal logic is the representation of the syllogism.

§ 13. *Introduction to the Logic of Quantity.*—The great importance of the idea of quantity in demonstrative reasoning seems to me not yet sufficiently explained. It appears, however, to be connected with the circumstance that the relations of being greater than and of being at least as great as are transitive relations. Still, a satisfactory evolutionary logic of mathematics remains a desideratum. I intend to take up that problem in a future paper. Meantime the development of projective geometry and of geometrical topics has shown that there are at least two large mathematical theories of continuity into which the idea of continuous *quantity*, in the usual sense of that word, does not enter at all. For projective geometry Schubert has developed an algebraical calculus which has a most remarkable affinity to the Boolian algebra of logic. It is, however, imperfect, in that it only gives imaginary points, rays, and planes, without deciding whether they are real or not. This defect cannot be remedied until topology—or, as I prefer to call it, mathematical topics—has been further developed and its logic accurately analysed. To do this ought to be one of the first tasks of exact logicians. But before that can be accomplished, a perfectly

satisfactory logical account of the conception of continuity is required. This involves the definition of a certain kind of infinity; and in order to make that quite clear, it is requisite to begin by developing the logical doctrine of infinite multitude. This doctrine still remains, after the works of Cantor, Dedekind, and others, in an inchoate condition. For example, such a question remains unanswered as the following: Is it, or is it not, logically possible for two collections to be so multitudinous that neither can be put into a one-to-one correspondence with a part or the whole of the other? To resolve this problem demands, not a mere *application* of logic, but a further *development* of the conception of logical possibility.

I formerly defined the possible as that which in a given state of information (real or feigned) we do not know not to be true. But this definition to-day seems to me only a twisted phrase which, by means of two negatives, conceals an anacoluthon. We know in advance of experience that certain things are not true, because we see they are impossible. Thus, if a chemist tests the contents of a hundred bottles for fluorine, and finds it present in the majority, and if another chemist tests them for oxygen and finds it in the majority, and if each of them reports his result to me, it will be useless for them to come to me together and say that they know infallibly that fluorine and oxygen cannot be present in the same bottle; for I see that such infallibility is *impossible*. I know it is not true, because I satisfy myself that there is no room for it even in that ideal world of which the real world is but a fragment. I need no sensible experimentation, because ideal experimentation establishes a much broader answer to the question than sensible experimentation could give. It has come about through the agencies of development that man is endowed with intelligence of such a nature that he can by ideal experiments ascertain that in a certain universe of logical possibility certain combinations occur while others do not occur. Of those which occur in the ideal world some do and some do not occur in the real world; but all that occur in the real world occur also in the ideal world. For the real world is the world of sensible experience, and it is a part of the process of sensible experience to locate its facts in the world of ideas. This

is what I mean by saying that the sensible world is but a fragment of the ideal world. In respect to the ideal world we are virtually omniscient; that is to say, there is nothing but lack of time, of perseverance, and of activity of mind to prevent our making the requisite experiments to ascertain positively whether a given combination occurs or not. Thus, every proposition about the ideal world can be ascertained to be either true or false. A description of thing which occurs in that world is *possible, in the substantive logical sense.* Very many writers assert that everything is logically possible which involves no contradiction. Let us call that sort of logical possibility, *essential,* or *formal,* logical possibility. It is not the only logical possibility; for in this sense, two propositions contradictory of one another may both be severally possible, although their combination is not possible. But in the *substantive* sense, the contradictory of a possible proposition is impossible, because we are virtually omniscient in regard to the ideal world. For example, there is no contradiction in supposing that only four, or any other number, of independent atoms exist. But it is made clear to us by ideal experimentation, that five atoms are to be found in the ideal world. Whether all five are to be found in the sensible world or not, to say that there are only four in the ideal world is a proposition absolutely to be rejected, notwithstanding its involving no contradiction.

It would be a great mistake to suppose that ideal experimentation can be performed without danger of error; but by the exercise of care and industry this danger may be reduced indefinitely. In sensible experimentation, no care can always avoid error. The results of induction from sensible experimentation are to afford some ratio of frequency with which a given consequence follows given conditions in the existing order of experience. In induction from ideal experimentation, no particular order of experience is forced upon us; and consequently no such numerical ratio is deducible. We are confined to a dichotomy: the result either is that some description of thing occurs or that it does not occur. For example, we cannot say that one number in every three is divisible by three and one in every five is divisible by five. This is, indeed,

so if we choose to arrange the numbers in the order of counting but if we arrange them with reference to their prime factors, just as many are divisible by one prime as by another. I mean, for instance, when they are arranged as follows:

1, 2, 4, 8, etc.	5, 10, 20, 40, etc.	7, 14, 28, 56, etc.	35, 70, etc.
3, 6, 12, 24, etc.	15, 30, 60, 120, etc.	21, 42, 84, 168, etc.	105, 210, etc.
9, 18, 36, 72, etc.	45, 90, 180, 360, etc.	etc.	etc.
27, 54, 108, 16, etc.	135, 270, 540, 1080, etc.		
etc.	etc.		

Thus, dichotomy rules the ideal world. Plato, therefore, for whom that world alone was real, showed that insight into concepts but dimly apprehended that has always characterised philosophers of the first order, in holding dichotomy to be the only truthful mode of division. Lofty moral sense consists in regarding, not indeed *the*, but yet *an*, ideal world as in some sense the only real one; and hence it is that stern moralists are always inclined to dual distinctions.

Ideal experimentation has one or other of two forms of results. It either proves that $\Sigma_i\, m_i$, a particular proposition true of the ideal world, and going on, finds $\Sigma_j\, \overline{m}_j$ also true; that is, that m and $\overline{m}$ are both possible, or it succeeds in its induction and shows the universal proposition $\Pi_i\, m_i$ to be true of the ideal world; that is that $\overline{m}$ is *necessary* and m *impossible*.

Every result of an ideal induction clothes itself, in our modes of thinking, in the dress of a *contradiction*. It is an anacoluthon to say that a proposition is impossible *because* it is selfcontradictory. It rather is thought so as to appear selfcontradictory, because the ideal induction has shown it to be impossible. But the result is that in the absence of any interfering contradiction every particular proposition is possible in the substantive logical sense, and its contradictory universal proposition is impossible. But where contradiction interferes this is reversed.

In former publications I have given the appellation of *universal* or *particular* to a proposition according as its *first* quantifier is Π or Σ. But the study of substantive logical possibility has led me to substitute the appellations *negative* and *affirmative* in this sense,

and to call a proposition *universal* or *particular* according as its *last* quantifier is Π or Σ. For letting l be any relative, one or other of the two propositions

$$\Pi_i \Sigma_j l_{ij} \qquad \Sigma_i \Pi_j \bar{l}_{ij}$$

and one or other of the two propositions

$$\Pi_j \Sigma_i \bar{l}_{ij} \qquad \Sigma_j \Pi_i l_{ij}$$

are true, while the other one of each pair is false. Now, in the absence of any peculiar property of the special relative l, the two similar forms $\Sigma_i \Pi_j \bar{l}_{ij}$ and $\Sigma_j \Pi_i l_{ij}$ must be equally possible in the substantive logical sense. But these two propositions cannot both be true. Hence, both must be false in the ideal world, in the absence of any constraining contradiction. Accordingly, these ought to be regarded as universal propositions, and their contradictions, $\Pi_i \Sigma_j l_{ij}$ and $\Pi_j \Sigma_i \bar{l}_{ij}$, as particular propositions.

There are two opposite points of view, each having its logical value, from one of which, of two quantifiers of the same proposition, the preceding is more important than the following, while from the other point of view the reverse is the case. Accordingly, we may say that an affirmative proposition is particular in a secondary way, and that a particular proposition is affirmative in a secondary way.

If an index is not quantified at all, the proposition is, with reference to that index, *singular*. To ascertain whether or not such a proposition is true of the ideal world, it must be shown to depend upon some universal or particular proposition.

If some of the quantifiers refer not to hecceities, having in themselves no general characters except the logical characters of identity, diversity, etc., but refer to *characters*, whether non-relative or relative, these alone are to be considered in determining the "quantity" of an ideal proposition as universal or particular. For anything whatever is true of *some* character, unless that proposition be downright absurd; while nothing is true of *all* characters except what is formally necessary. Consider, for example, a dyadic relation. This is nothing but an aggregation of pairs. Now any two hecceities may in either order form a pair; and any aggregate whatever of such pairs will form *some* dyadic relation. Hence, we may totally disregard the manner in which the hecceities are connected

in determining the possibility of a hypothesis about *some* dyadic relation.

Characters have themselves characters, such as importance, obviousness, complexity, and the like. If some of the quantified indices denote such characters of characters, they will, in reference to a purely ideal world be paramount in determining the quantity of the proposition as universal or particular.

All quantitative comparison depends upon a *correspondence.* A correspondence is a relation which every subject[1] of one collection bears to a subject of another collection, to which no other is in the same relation. That is to say, the relative "corresponds to" has

$$\sum_u u \cdot (1 \between \bar{u})$$

not merely as its *form*, but as its *definition.* This relative is transitive; for its relative product into itself is

$$[\sum_u u \cdot (1 \between \bar{u})][\sum_v v \cdot (1 \between \bar{v})] \prec \sum_u \sum_v uv \cdot (1 \between \bar{u})(1 \between \bar{v})$$
$$\prec \sum_u \sum_v uv \cdot (1 \between \bar{u} \between \bar{v}) \prec \sum_u \sum_v uv \cdot (1 \between \overline{uv}) \prec \sum_w w \cdot (1 \between \bar{w})$$

But it is to be observed that if the P's, the Q's, and the R's are three collections, it does not follow because every P corresponds to an R, and every Q corresponds to an R that every object of the aggregate collection $P + Q$ corresponds to an R. The *dictum de omni* in external appearance fails here. For P may be $[u \cdot (1 \between \bar{u})]R$ and Q may be $[v \cdot (1 \between \bar{v})]R$; but the aggregate of these is not $[(u + v) \cdot (1 \between \overline{u + v})]R$, which equals $[(u + v) \cdot (1 \between \bar{u}) \cdot (1 \between \bar{v})]R$. The aggregate of the two first is $\{(u \between v) \cdot [v \cdot (1 \between \bar{v}) + 1 \between \bar{u}] . [u \cdot (1 \between \bar{u}) + 1 \between \bar{v}]\}R$, which is obviously too broad to be necessarily included under the other expression. Correspondence is, therefore, not a relation between the subjects of one collection and those of another, but between the collections themselves. Let $q_{\alpha i}$ mean that i is a subject of the collection, α, and let $r_{\beta jk}$ mean that j stands in the relation β to k. Then, to say that the collection P corresponds to the collection Q, or, as it is sometimes expressed, that "*for* every

[1] I prefer to speak of a member of a collection as a *subject* of it rather than as an *object* of it; for in this way I bring to mind the fact that the collection is virtually a quality or class-character.

subject of Q there is a subject of P," is to make the assertion expressed by

$$\Sigma_\beta \Pi_i \Sigma_j \Pi_k \bar{q}_{Pi} \curlyvee r_{\beta ij} \cdot (1_{ik} \curlyvee \bar{r}_{\beta kj}) \cdot q_{Qj}.$$

In the algebra of dual relatives this may be written

$$\Sigma_\beta P \prec \bar{q} \mathfrak{J} [r_\beta \cdot (1 \mathfrak{J} \bar{r}_\beta)] \breve{q} Q.$$

The transitivity is evident; for

$$\begin{aligned}
&\Sigma_\beta \Sigma_\gamma \bar{q} \mathfrak{J} [r_\beta \cdot (1 \mathfrak{J} \bar{r}_\beta)] \breve{q} \{ \bar{q} \mathfrak{J} [r_\gamma \cdot (1 \mathfrak{J} \bar{r}_\gamma)] \breve{q} \} \\
\prec &\Sigma_\beta \Sigma_\gamma \bar{q} \mathfrak{J} [r_\beta \cdot (1 \mathfrak{J} \bar{r}_\beta)] \{ \breve{q} \bar{q} \mathfrak{J} [r_\gamma \cdot (1 \mathfrak{J} \bar{r}_\gamma)] \breve{q} \} \\
\prec &\Sigma_\beta \Sigma_\gamma \bar{q} \mathfrak{J} [r_\beta \cdot (1 \mathfrak{J} \bar{r}_\beta)] \{ \mathrm{T} \mathfrak{J} [r_\gamma \cdot (1 \mathfrak{J} \bar{r}_\gamma)] \breve{q} \} \\
\prec &\Sigma_\beta \Sigma_\gamma \bar{q} \mathfrak{J} [r_\beta \cdot (1 \mathfrak{J} \bar{r}_\beta)] [r_\gamma \cdot (1 \mathfrak{J} \bar{r}_\gamma)] \breve{q} \\
\prec &\Sigma_\beta \Sigma_\gamma \bar{q} \mathfrak{J} [r_\beta r_\gamma \cdot (1 \mathfrak{J} \bar{r}_\beta \mathfrak{J} \bar{r}_\gamma)] \breve{q} \\
\prec &\Sigma_\delta \bar{q} \mathfrak{J} [r_\delta \cdot (1 \mathfrak{J} \bar{r}_\delta)] \breve{q}.*
\end{aligned}$$

Not only is the relative of correspondence transitive, but it also possesses what may be called *antithetic transitivity*. Namely, if c be the relative, not only is $cc \prec c$ but also $c \prec c \mathfrak{J} c$. To demonstrate this very important proposition is, however, far from easy. The quantifiers of the assertion that for every subject of one character there is a subject of another are $\Sigma_\beta \Pi_i \Sigma_j \Pi_k$. Hence, the proposition is particular and will be true in the ideal world, except in case a positive contradiction is involved.

Let us see how such contradiction can arise. The assertion that for every subject of P there is a subject of Q is

$$\Sigma_\beta \Pi_i \Sigma_j \Pi_k \bar{q}_{Pi} \curlyvee r_{\beta ij} \cdot (1_{ik} \curlyvee \bar{r}_{\beta ki}) \cdot q_{Qj}.$$

This cannot vanish if the first aggregant term does not vanish, that is, if $\Pi_i q_{Pi}$ or there is no subject of P. It cannot vanish if everything is a subject of Q. For in that case, the last factor of the latter aggregant disappears, and substituting 1 for r_β the second aggregant becomes ∞. The expression cannot vanish if every subject of P is a subject of Q. For when 1 is substituted for r_β, we get

$$\Pi_i \bar{q}_{Pi} \curlyvee q_{Qi}.$$

If P has but a single individual subject and Q has a subject, for every P there is a Q. For in this case we have only to take for β

*It must be remembered that to a person familiar with the algebra all such series of steps become evident at first glance.

the relation of the subject of P to any one of the subjects of Q. But if P has more than one subject, and Q has but one, the expression above vanishes. For let 1 and 2 be the two subjects of P. Substituting 1 for i, we get

$$\Pi_k\, r_{\beta 1 j} \cdot (1_{1k} + \bar{r}_{\beta k j}) \cdot q_{Qj}$$

Substituting 2 for i we get

$$\Pi_k\, r_{\beta 2 j} \cdot (1_{2k} + \bar{r}_{\beta k j}) \cdot q_{Qj}$$

Multiplying these

$$\Pi_k\, \Pi_k\, r_{\beta 1 j} \cdot r_{\beta 2 j} \cdot (1_{1k} + \bar{r}_{\beta k j}) \cdot (1_{2k'} + \bar{r}_{\beta k j}) \cdot q_{Qi}$$

Substituting 2 for k and 1 for k', this gives

$$r_{\beta 1 j} \cdot r_{\beta 2 j} \cdot \bar{r}_{\beta 2 j} \cdot {}_{\beta 1 j} \cdot Q_{qi}$$

which involves two contradictions.

It is to be remarked that although if every subject of P is a subject of Q, then for every subject of P there is a subject of Q, yet it does not follow that if the subjects of P are a part only of the subjects of Q, that there is then not a subject of P for every subject of Q. For example, numbering 2, 4, 6, etc., as the 1st, 2nd, 3rd, etc., of the even numbers, there is an even number for every whole number, although the even numbers form but a part of the whole numbers.

It is now requisite, in order to prove that $c \prec c \mathrel{\mathfrak{J}} c$, to draw three propositions from the doctrine of substantive logical possibility. The first is that given any relation, there is a possible relation which differs from the given relation only in excluding any of the pairs we may choose to exclude. Suppose, for instance, that for every subject of P there is a subject of Q, that is that

$$\Sigma_\beta\ \breve{q}\,\mathrm{P} \prec [r_\beta \cdot (1 \mathrel{\mathfrak{J}} \bar{r}_\beta)]\breve{q}\,\mathrm{Q}.$$

The factor $(1 \mathrel{\mathfrak{J}} \bar{r}_\beta)$ here has the effect of allowing each correlate but one relate. Each relate is, however, allowed any number of correlates. If we exclude all but one of these, the one retained being, if possible, a subject of Q, we have a possible relation, β', such that

$$\Sigma_{\beta'}\ \breve{q}\,\mathrm{P} \prec [r_{\beta'} \cdot (1 \mathrel{\mathfrak{J}} \bar{r}_{\beta'}) \cdot (\bar{r}_{\beta'} \mathrel{\mathfrak{J}} 1)]\breve{q}\,\mathrm{Q}.$$

The second proposition of substantive logical possibility is that whatever is true of *some* of a class is true of the whole of *some* class. That is, if we accept a proposition of the form $\Sigma_i\, a_i \cdot b_i$, we can write

$$\Sigma_\gamma\, \Pi_i\, \bar{q}_{\gamma i} + \bar{a}_i + b_i,$$

though this will generally fail positively to assert, in itself, what is implied, that the collection j excludes whatever is a but not b, and includes something in common with a. There are, however, cases in which this implication is easily made plain.

Applying these two principles to the relation of correspondence, we get a new statement of the assertion that for every P there is a Q. Namely, if we write $a_{\alpha i}$ to signify that i is a relate of the relative r_α to some correlate, that is if $a_{\alpha i} = (i \prec r_\alpha \varphi)$, if we write $b_{\alpha j}$ to signify that j is a correlate of the relative r_α to some relate, that is if $b_{\alpha j} = (j \prec \breve{r}_\alpha \varphi)$, and if we write $p_{c\alpha}$ to signify that r_α is an aggregate of the relative r_c, that is, if $p_{c\alpha} = (r_\alpha \prec r_c)$, then the proposition that for every subject of P there is a subject of Q may be put in the form,

$$\Sigma_c \Sigma_\gamma \Pi_x \Pi_y \Sigma_\delta \Sigma_\alpha \Pi_\alpha \Sigma_i \Sigma_j \Pi_\beta \Pi_u \Pi_v$$
$$[\bar{p}_{c\alpha} \dotplus a_{\alpha i} \cdot q_{Pi} \cdot b_{\alpha j} \cdot q_{Qj} \cdot q_{\gamma j} \cdot (\bar{a}_{\alpha u} \dotplus 1_{iu}) \cdot (b_{\alpha v} \dotplus 1_{jv}) \cdot (\bar{p}_{c\beta} \dotplus 1_{\alpha\beta} \dotplus \bar{a}_{\beta i} \cdot$$
$$b_{\beta j})] \cdot (\bar{q}_{Px} \dotplus a_{\delta x} \cdot p_{c\delta}) \cdot (\bar{q}_{Qy} \dotplus \bar{q}_{\gamma y} \dotplus b_{\alpha y} \cdot p_{c\alpha}).$$

This states that there is a collection of pairs, c, any single pair of which, α, has for its sole first subject a subject of P, and for its sole second subject a subject of Q which is at the same time a subject of a collection, j, and that no two pairs of the collection, c, have the same first subject or the same second subject, and that every subject of P is a first subject of some pair of this collection, c, and every subject of Q which is at the same time a subject of γ is a second subject of some pair of the same collection, c.

The third proposition of the doctrine of substantive logical possibility of which we have need is that all hecceities are alike in respect to their capacity for entering into possible pairs. Consequently, all the objects of any collection whatever may be severally and distinctly paired with all the objects of a collection which shall either be wholly contained in, or else shall entirely contain, any other collection whatever. Consequently,

$$\Pi_P \Pi_Q \Sigma_c \Sigma_\delta \Pi_x \Sigma_\delta \Pi_y \Sigma_\delta \Pi_\alpha \Sigma_i \Sigma_j \Pi_u \Pi_v \Pi_\beta \Pi_m \Pi_n$$
$$[\bar{p}_{c\alpha} \dotplus a_{\alpha i} \cdot q_{Pi} \cdot b_{\alpha j} \cdot q_{\delta j} \cdot (\bar{a}_{\alpha u} \dotplus 1_{uu}) \cdot (b_{\alpha v} \dotplus 1_{vj}) \cdot (\bar{p}_{c\beta} \dotplus 1_{\alpha\beta} \dotplus \bar{a}_{\beta i} \cdot$$
$$b_{\beta j})] \cdot (\bar{q}_{\delta x} \dotplus a_{\delta x} \cdot p_{c\delta}) \cdot (\bar{q}_{\delta y} \dotplus b_{\alpha y} \cdot p_{c\alpha}) \cdot (\bar{q}_{\delta m} \dotplus q_{Qm} \dotplus \bar{q}_{Qn} \dotplus q_{\delta n}).$$

Although the above three propositions belong to a system of doctrine not universally recognised, yet I believe their truth is unquestionable. Suppose, now, that it is not true that for every subject of P there is a subject of Q. Then, in the last formula, $\Pi_m \bar{q}_{\delta m} \Psi q_{Qm} \prec 0$. This leaves for the last factor $\Pi_n \bar{q}_{Qn} \Psi q_{\delta n}$, and then the formula expresses that for every subject of Q there is a subject of P. In other words, we have demonstrated the important proposition that *two collections cannot be disparate in respect to correspondence*, but that for every subject of the one there must be a subject of the other.

The theorem $c \prec c \mathfrak{J} c$ is now established; for since of any two collections one corresponds to the other, we have $\varphi \prec c \Psi \breve{c}$ or (non-relatively multiplying by $\breve{c}$) $\breve{c} \prec c$. Hence, $c \prec 1 c \prec (\breve{c} \mathfrak{J} c)$ $c \prec \breve{c} \mathfrak{J} c c \prec c \mathfrak{J} c c$; and, by the transitive principle $c c \prec c$, we finally obtain $c \prec c \mathfrak{J} c$.

Thus is established the conception of *multitude*. Namely, if for every subject of P there is a subject of Q, while there is not for every subject of Q a subject of P, the *multitude* of Q is said to be *greater* than that of P. But if for every subject of each collection there is a subject of the other, the *multitudes* of the two collections are said to be *equal* the one to the other. We may create a scale of objects, one for every group of equal collections. Calling these objects *arithms*, the first arithm will belong to 0 considered as a collection, the second to individuals, etc. Calling a collection the counting of which can be completed an *enumerable* collection, the multitude of any enumerable collection equals that of the arithms that precede its arithm. Calling a collection whose multitude equals that of all the arithms of enumerable collection a *denumerable* collection (because its subjects can all be distinguished by ordinal numbers, though the counting of it cannot be completed), the arithms preceding the arithm of denumerable collections form a denumerable collection. More multitudinous collections are greater than the collections of arithms which precede their arithm.

Let there be a denumerable collection, say the cardinal numbers; and let there be two houses. Let there be a collection of

children, each of whom wishes to have those numbers placed in some way into those houses, no two children wishing for the same distribution, but every distribution being wished for by some child. Then, as Dr. George Cantor has proved, the collection of children is greater in multitude than the collection of numbers. Let a collection equal in multitude to that collection of children be called an *abnumeral* collection *of the first dignity*. The real numbers (surd and rational) constitute such a collection.

I now ask, suppose that for every way of placing the subjects of one collection in two houses, there is a way of placing the subjects of another collection in two houses, does it follow that for every subject of the former collection there is a subject of the latter? In order to answer this, I first ask whether the multitude of possible ways of placing the subjects of a collection in two houses can equal the multitude of those subjects. If so, let there be such a multitude of children. Then, each having but one wish, they can among them wish for every possible distribution of themselves among two houses. Then, however they may actually be distributed, some child will be perfectly contented. But ask each child which house he wishes himself to be in, and put every child in the house where he does not want to be. Then, no child would be content. Consequently, it is absurd to suppose that any collection can equal in multitude the possible ways of distributing its subjects in two houses.

Accordingly, the multitude of ways of placing a collection of objects abnumeral of the first dignity into two houses is still greater in multitude than that multitude, and may be called abnumeral of the second dignity. There will be a denumerable succession of such dignities. But there cannot be any multitude of an infinite dignity; for if there were, the multitude of ways of distributing it into two houses would be no greater than itself.[1]

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[1] Inasmuch as the above theorem is, as I believe, quite opposed to the opinion prevalent among students of Cantor, and they may suspect that some fallacy lurks in the reasoning about wishes, I shall here give a second proof of a part of the theorem, namely that there is an endless succession of infinite multitudes related to one another as above stated, a relation entirely different, by the way, from those of the orders of infinity used in the calculus. I shall not be able to prove by this

We thus not only answer the question proposed, and show that of two unequal multitudes the multitude of ways of distributing the greater is the greater; but we obtain the entire scale of collectional

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second method, as is proved in the text, that there are no higher multitudes, and in particular no maximum multitude.

The ways of distributing a collection into two houses are equal to the possible combinations of members of that collection (including zero); for these combinations are simply the aggregates of individuals put into either one of the houses in the different modes of distribution. Hence, the proposition is that the combinations of whole numbers are more multitudinous than the whole numbers, that the combinations of combinations of whole numbers are still more multitudinous, the combinations of combinations of combinations again more multitudinous, and so on without end.

I assume the previously proved proposition that of any two collections there is one which can be placed in one-to-one correspondence with a part or the whole of the other. This obviously amounts to saying that the members of any collection can be arranged in a linear series such that of any two different members one comes later in the series than the other.

A part may be equal to the whole; as the even numbers are equal in multitude to all the numbers (since every number has a double distinct from the doubles of all other numbers, and that double is an even number). Hence, it does not follow that because one collection can be placed in one-to-one correspondence to a part of another, it is less than that other, that is, that it cannot also, by a rearrangement, be placed in one-to-one correspondence with the whole. This makes an inconvenience in reasoning which can be overcome in a manner I proceed to describe.

Let a collection be arranged in a linear series. Then, let us speak of a *section* of that series, meaning the aggregate of all the members which are later than (or as late as) one *assignable* member and at the same time earlier than (or as early as) a second *assignable* member. Let us call a series *simple* if it cannot be severed into sections each equal in multitude to the whole. A series not simple itself may be conceivably severed into *simple sections*, or it may be so arranged that it cannot be so severed (for example the series of rational fractions arranged in the order of their magnitudes). But suppose two collections to be each ranged in a linear series, and suppose one of them, A, is in one-to-one correspondence with a part of the other B. If now the latter series, B, can be severed into simple sections, in each of which it is possible to find a member at least as early in the series as any member of that section that is in correspondence with a member of the other collection A, and also a member at least as late in the series as any member of that section that is in correspondence with any member of the other collection, and if it is also possible to find a section of the series, B, equal to the whole series, B, in which it is possible to find a member *later* than any member that is in correspondence with any member of the collection, A, then I say that the collection, B, is greater than the collection, A. This is so obvious that I think the demonstration may be omitted.

Now, imagine two infinite collections, the α's and the β's, of which the β's are the more multitudinous. I propose to prove that the possible combinations of β's are more multitudinous than the possible combinations of α's. For let the pairs of conjugate combinations (meaning by conjugate combinations a pair each of which includes every member of the whole collection which the other excludes) of the β's be arranged in a linear series; and those of the α's in another linear series. Let the order of the pairs in each of the two series be subject to the rule that if of two pairs one contains a combination composed of fewer members than either combination of the other pair, it shall precede the latter in the series. Let the order of the pairs in the series of pairs of combinations of β's be further determined by the rule that where the first rule does not decide, one of two pairs shall precede the other whose smaller combination (this rule not applying where one combinations are equal) contains fewer β's which are in correspondence with α's in one fixed correspondence of all the α's with a part of the β's.

In this fixed correspondence each α has its β, while there is an infinitely greater multitude of β's without α's than with. Let the two series of pairs of combinations

quantity, which we find to consist of two equal parts (that is two parts whose multitudes of grades are equal), the one finite, the other infinite. Corresponding to the multitude of 0 on the finite scale is the abnumeral of 0 dignity, which is the denumerable, on the infinite scale, etc.

So much of the general logical doctrine of quantity has been here given, in order to illustrate the power of the logic of relatives in enabling us to treat with unerring confidence the most difficult conceptions, before which mathematicians have heretofore shrunk appalled.

I had been desirous of examining Professor Schröder's developments concerning individuals and individual pairs; but owing to the length this paper has already reached, I must remit that to some future occasion.

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NEW YORK.

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be so placed in correspondence that every pair of unequal combinations of α's is placed in correspondence with that pair of combinations of β's of which the smaller contains only the β's corresponding in the fixed correspondence to the smaller combination of α's; and let every pair of equal combinations of α's be put into correspondence with a pair of β's of which the smaller contains only the β's belonging in the fixed correspondence to one of the combinations of α's.

Then it is evident that each series will generally consist of an infinite multitude of simple sections. In none of these will the combinations be more multitudinous than those of the β's. In some, the combinations of α's will be equal to those of the β's; but in an infinitely greater multitude of such simple sections and each of these infinitely more multitudinous, the combinations of β's will be infinitely more multitudinous than those of the α's. Hence it is evident that the combinations of the β's will on the whole be infinitely more multitudinous than those of the α's.

That is if the multitude of finite numbers be a, and $2^a = b$, $2^b = c$, $2^c = d$, etc $a < b < c < d <$ etc. *ad infinitum.*

It may be remarked that the *finite* combinations of finite whole numbers form no larger a multitude than the finite whole numbers themselves. But there are nfinite collections of finite whole numbers; and it is these which are infinitely more numerous than those numbers themselves.

SCIENCE AND FAITH.[1]

II. INTRODUCTION TO MAN AS A MEMBER OF SOCIETY. (CONTINUED.)

III. ANIMAL SOCIETIES.

WE HAVE seen that the principal agent employed by evolution in the creation of organisms of increasing complexity is association. Individuals join together in aggregates, preserve their independence for a greater or less period of time, gradually adapt themselves to one another, and end by becoming amalgamated in a single organism. Where there were many individuals there is now but one. Cohesion has given rise to continuity among all the parts, that is to say, to morphological unity.

The kind of association which we are now about to consider is entirely different. Here, the individuals, although still parts of aggregates, are unrestrained and distinct; they come and go; their egos are preserved intact; the bond which unites them is virtual not material. Nevertheless, a large body of philosophers regard the two sorts of association as essentially the same; others, but slightly differing from them, restrict themselves to simple comparison. Some writers have gone so far as to contend that their principles and organisations, rudimentary in animals but as real there as in man, as well as the laws that govern them, are identical. We shall see what this amounts to.

We have already learned that morphology and physiology both tend to reduce the causes which lead animals generally, and the

[1] Translated from Dr. Topinard's MS. by Thomas J. McCormack. For the two preceding articles of this series see Vol. VI., No. 1 and No. 4.

highest particularly, to form temporary or continued associations, to two: the necessity of satisfying the wants of the organism, the upshot of which is egoism, as a matter of imperative duty; and the need of relations with one's fellows, which culminates in altruism, a product of development from egoism by differentiation.

Struggle for existence, emulation, and competition,—three things which hang together,—are the logical consequences of egoism. The best endowed, those which know best how to take advantage of the opportunities offered, survive and increase. The acutest form of this antagonism is where one animal, to stay his hunger, is forced to devour another. A second widely-spread form is *parasitism*, in which the animal takes up his abode upon or within another and partakes gradually of the latter, according to his needs. Next comes *commensalism*, in which the animal still selects its abode on the surface or in the interior of another, but confines its operations to taking advantage of its situation without doing harm to its host. Example, the little red crab of our common oyster. The following cases are of an allied order: the case of Amphibena, a bird which inhabits ant-hills under sufferance of their proprietors; that of *Elaphis esculapis*, which shares its nook in the thicket with a swarm of hornets; and that of the pilot-fish and the remora who keep company with the shark.

Next comes the state of *unilateral mutualism*, in which one species is made use of by another and performs services for the latter but without receiving anything in exchange. The instance of the crocodile and of the bird Trochilus, on the banks of the Nile, is well known. This bird performs two services for the crocodile. It enters its mouth and dispatches there the worms and leeches which trouble the crocodile; it flies rapidly away, giving vent to a peculiar cry when the ichneumon, the enemy of the crocodile, approaches, thus apprising its companion of the ichneumon's presence. In return the crocodile shakes its tail whenever it wishes to close its mouth, thus giving the bird warning. The crocodile in no wise recompenses, but contents itself simply with respecting the person of the little animal. The service rendered is unilateral. But it is easy to understand that by the exercise of extremely little intelli-

gence, if not unconsciously, the crocodile may be led to defend its Trochilus. The same remarks are applicable to birds which associate with certain Ungulata—as Hyas and Ardea with the hippopotamus, Textor with the buffalo of Kaffraria, Buphaga with the elephant of Asia, Ardeola with the elephant of Africa—and which follow them and devour the insects lodged in their thick skins. Interest is the sole impulse of these birds, and in all likelihood it would also be that of the Ungulata in defending them.

The domestication of one species by another is a further instance of unilateral mutualism. A good example of this is that of certain ants who reduce other species to slavery and allow themselves to be fed by them. When man causes domesticated animals to administer to his wants, his pleasures, or his caprice, he supports them in return for their pains, but it is also true that he cruelly slays them when they have ceased to be useful or pleasing to him.

As an example of *bilateral mutualism* we shall cite the case of certain aphids and ants. The aphids secrete an abdominal fluid which distends them ; the ants are passionately fond of this secretion, suck the same from the aphids, and finally, in order to keep this precious source of nutrition always at hand, provide them with food ; the result being that the aphids are converted into genuine milch cows which are kept and watched in stables. Another example is that of the indicator-bird or honey-guide, and man. The former arrests the latter by his cries and points out to him the location of beehives, by which both then profit. If this partnership were not formed, the one could not obtain the chrysalids of which it is fond, nor the other the honey. Continuing thus, we come to the cases where one animal borrows the services of another temporarily, as is the case with the serpent, who is ferried across a river by a duck, or to the cases where several animals assist one another in crossing streams of water, in lifting a large stone, in moving the trunk of a tree, in constructing a dam, in hunting, or in mutual defence.

The second cause which induces animals to associate together is possibly more powerful—*the need of company.* The struggle for

existence is not so general nor merciless as some extreme disciples of Darwin would maintain. There are frequent lulls. Many species do not have antagonistic wants; the animal is not always possessed of blind hunger; he does not always covet the place of his neighbor; his motives for quarrelling are sometimes extremely slight. The Carnivora are the born enemies of the species that constitute their food, but the Herbivora have only a desire for plants, fruits, roots, barks, etc. Both the one and the other have their moments of necessary repose. Rest is as imperious a want as activity. The Carnivora give most of their time to activity, but the Herbivora spend the greater part in rest. Buffon goes too far, but is in a measure right, when he says: "The animals that live on the fruits of the earth are the only ones that form societies. Abundance is the foundation of social instinct, of that gentleness of manner and peacefulness of life which characterise only those who have no grounds for quarrelling." In fact, a danger which keeps one constantly on the alert, a gloomy climate, a desert country, the necessity of always thinking of the prey which one stands in need of, lead to agitation, to defiance, and to egoism. On the other hand, security, the absence of anxiety, beauty of environment, abundance of food, and rumination, lead to *far niente*, to sympathy, and to love. The animal has no aversion for those who intend him no harm; he approaches, regards his observers with curiosity, and even seems to solicit their caresses. Darwin has described the tameness of wild birds towards man. The latter is shunned only by animals who have learned at their cost to fear him. Man is the greatest enemy of animal societies. Prior to his time, they were unquestionably very numerous. The pastures of Pikermi in the Miocene epoch, the innumerable and multifarious herds of mixed species which the first travellers in Central Africa encountered, are a confirmation of this fact. The societies of buffaloes, of beavers, of chamois, and of numerous other mammals, all dwindled and melted away on his coming. Extensive societies of birds are encountered only in regions sparsely settled by man, as in the northern countries which Dr. Labonne visited. Where man does not slay, he domesticates. The natural troops of the

Andes and of the Himalayas have been replaced by more or less domesticated troops. We assist in the destruction of animal societies.

Whatever be the physiological mechanism by which it is engendered, whether that which I have set forth in a preceding article or some other, it is an undeniable fact that the social sentiment does exist in varying degrees in the majority of animals. All, from the reptiles up, but particularly the birds and the higher mammals, possess the emotional sensibility from which it is derived or which is the consequence of it. Animals associate individually with their fellows or with different species; they exhibit sympathy, and they love, sometimes intensely, sometimes unto death. Every one has witnessed the surprising friendships which frequently spring up between two animals of contradictory characters, even among Carnivora,—friendships which sometimes neutralise the most antagonistic instincts. This sensibility is differentiated in a multitude of ways. Mr. Romanes has followed it up under the heading of "Emotions" in his work on *Animal Intelligence*. It is an admitted fact that in domestication man has only developed qualities which pre-existed in the species. No one will deny but altruism has attained its highest development in the dog, to mention but a single instance.

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In the Fishes we meet with five or six kinds of associations or assemblages, to wit: (1) assemblages between species or between individuals of the same species which should be styled *indifferent*. These are numerous even throughout the entire range of invertebrates, as among the sponges, corals, mollusks, and insects, and depend on conditions of nutrition, of temperature, or shelter, of sandy or rocky bottoms, of calm or agitated environments, according as these conditions suit with the same needs of different species. All that is necessary is that such contiguous species should have little ground for quarelling. (2) Assemblages of the same species, the object of which is hunting in company. Such are the shark and the dog-fish who form shoals in the Channel and pursue the herring; or the carps, who also "live together," we are told, and hunt in company. (3) Associations of the same species for distant voy-

ages. The simple fact that we have to deal here with one species only, like the herring or the sardine, proves that such assemblages are less indifferent than the others. At certain times of the year bands of fishes assemble and travel off either for a change of climate by passing from a cold to a warm region, or in order to find certain kinds of food which abound elsewhere. These bands or shoals frequently comprise a countless number of individuals. Fishes enjoy exceptional facilities for such migrations; they are rapid and easy swimmers, and the currents, too, help them much. (4) Migratory associations, having in view the special end of spawning in remote but favorable localities, to which it is their custom to resort for this purpose. (5) Still another sort of this last kind of association, the object of which is less definite. The salmon is an example of it. Born near the sources of rivers, the salmon descends to the sea, sojourns there seven or eight months, and then again ascends in shoals of from thirty or forty to the place whence he came to perform there the functions of reproduction. Are the fish acquainted with one another under such circumstances? We do not know. At any rate, in certain species they play together.

In the Batrachia and Reptiles one of the conditions of assemblages is greatly weakened. These animals have not the same facility for moving about that fishes have; they creep around on the earth and are frequently very clumsy. Among the terrestrial Reptilia certain crocodiles undertake migrations, but only for short distances, along the banks of rivers. Among the marine Reptilia may be cited the turtles who journey annually to deposit their spawn on distant shores. Indifferent assemblages are frequent, for example, among lizards upon a surface exposed to the sun, or among crocodiles upon the shores of a lake or of a river. Does any durable bond actuate them? Crocodiles thus associating are totally indifferent to one another; no tie whatever results from their union. The lizards, on the other hand, live in perfect harmony and play together; some wander about in little bands, like the Varunus and the Gecko. The blind worm (*Anguis*), the rattlesnake, and *Tropidonotus viperinus* also associate in bands. Marine turtles remain together even after spawning, but seem to take no interest in

one another; they neither engage in mutual attack nor make mutual defence, but swim along together from force of habit. Was it this sort of companionship which led to migration for spawning, or was the contrary the case? A special cause of assemblages, entirely passive in character, may be observed in reptiles. I refer to their hibernation, or periodical torpor, during the long months of winter, where great advantage results from keeping each other warm in holes. Snakes and blind worms (*Anguidæ*) are thus frequently found twined together in solid masses. In 1876, in the forest of Fontainebleau, opposite Thomery, while blasting rock, the workmen came upon a cavity containing three hundred and twelve vipers who had taken up their abode there for the winter.

Birds.—These present all kinds of assemblages save that of hibernation, to-wit, indifferent assemblages; assemblages by pure sociability; assemblages for migratory purposes; assemblages between different species; assemblages for nesting together; and family assemblages.

The kind which gives rise to the largest assemblages is migration. The birds are in this regard even more favorably situated than the fishes; they cut the air with almost vertiginous velocity, changing their climate at will. Some in Europe, for example, descend from the northern countries, as is the case with the duck; others, starting from central regions, fly to the shores of the Mediterranean and Africa. The life of a migratory bird is passed as follows: In the winter in the South it lives according to its habits, either alone, or in groups, or, in exceptional cases, in pairs, dating from the preceding season. In the spring it departs. Reaching its destination, it devotes several months to reproduction, and during the time which is left to it it resumes its usual habits. In autumn, or later, it takes its flight again to the South. Sometimes it departs alone and remains alone during the whole passage, as does the woodcock. Sometimes it departs alone but falls in with companions on its way, which is the case with the quail, who ultimately arrives in flocks of some size, part of which stop in Provence, but the majority of which reach Africa. In some cases the two sexes form distinct groups, which do not join each other until after their ar-

rival, the males being in one flock and the females and their young in another, as is the case with the turkey and the fighting sandpiper (*Philomachus*). Most frequently a signal is given, all the individuals of the same species within a certain region assemble, turn, soar upwards, and depart in a body. Of this kind are the passenger-pigeon (*Ectopistes*), the swallow, the stork, the crane, the crow, the goose and the rook. Some journey only by day, others by night. These flocks vary in number from a few individuals to hundreds, to thousands, and, in one instance of the passenger-pigeon, estimated by Audubon, to 1,100,000. Sometimes isolated individuals or whole flocks of other species join them. In the majority of these societies harmony reigns; in others quarrels and serious combats arise. Save in the turkey, there is no noticeable head or chief of the flock, but frequently, as is the case with the crane and wild duck, there are leaders who take the head of the column and relieve each other by turns. Their flight is confused, in the shape of a triangle, whose vertex cuts the air, or in columns, or in groups. Sometimes the aged males, or the females with their young, or even the young males will fly separately. The few couples which are observed are those which had not separated on departure, or who, on returning, had just begun to mate for the coming season. On their arrival the assemblage or flock may remain intact for some weeks, or for one or two months, but in most cases it breaks up and is dispersed. In sum, they all obey collective habits which have been insensibly formed, consolidated, and converted into a periodical instinct, which the bird obeys. A quail, for example, kept in a warm cage, well fed, and ignorant of everything about him, experiences lively agitation at the time of annual migration, seeks to escape, dashes himself against the bars of his cage, and, as the upshot of his desperate attempts, may drop down dead. It would be useless to add that sedentary societies are transformed most readily of all into migratory societies, and that the spirit of sociability which is habitual with them has also its effects upon the latter.

Sedentary assemblages present many gradations from the indifferent or interested form to that which I have styled assemblages by pure sociability. It is not a temporary and intermittent neces-

sity that is in action here, but commonly a quite pronounced need of playing together, of singing together, of making responses, of abandoning oneself to all manner of pranks and crochets—in other words, of thorough enjoyment through companionship. They are permanent, but during intervals either of rut or of the whole series of reproductive phases. They are made up, according to the season and the species, now entirely of males who have completely or partially abandoned their females, now of males and females followed by their young, who have grown up and are continuing their education under the supervision of both parents or of the mother alone, and again of males, of females, and of offspring who are totally emancipated, the former either paying no regard whatever to each other or still continuing united.

Contrasted with the sociable birds of the preceding category, are the unsociable birds. The following are a few types leading from the latter to the former.

The first type is that of birds who are perfectly egotistical, who live entirely alone or indifferently with others without bestowing on them the least concern or paying them the least attention. Examples are the woodcock, the pheasant, the thrush (*Turdus*), the kingfisher, the cuckoo, and the albatross. The second type is of birds who in general life are egotistical, but possess some traces of family sentiment, and occasionally associate with a few of their fellows for purposes of hunting. The eagle, the vulture, and the falcon are varieties of this type. The third type is of birds who assemble in vast numbers without manifesting any interest at all for one another, but who understand on occasions how to combine their movements for common defence. Examples of this type are several marine birds like the sea-swallows and many stilt-birds. The fourth type is composed of birds which are egotistical, but which form closed and exclusive societies into which no strangers are admitted. An example of this type is the swan, who prefers to live alone rather than to join other groups even when it could be admitted. The fifth type is of birds who form open associations where harmony and happiness reign supreme. These are the immense majority. Such are the passenger-birds, the swallows, the Corvidæ, a large number

of stilt-birds and palmipeds, and the creepers. The parrot is the most advanced representative of this type. Parrots make expeditions like those of the cercopithecoid monkeys, which we shall speak of later, form organisations and station sentinels.

One of the most striking proofs of the spirit of sociability among birds is found in the facility with which many of them associate with individuals of different species but slightly distant from them zoölogically. Here again a gradation appears, running from absolutely indifferent assemblages to the most complicated and harmonious societies. The following are the degrees: (1) unsociable species which chance temporarily holds together but who take no interest in one another; examples of which are the eagle, the buzzard, the vulture, and the kite. (2) Species whose mutual company is agreeable but who do not seek one another, who contract no unions with one another, and derive no advantage from their mutual society; examples of these are the nut-hatch (*Sitta*), the tomtit (*Parus*), the finch (*Fringilla*), the kinglet (*Regulus*), and the creeper (*Certhia*). (3) Species which are egoistic and solitary by nature but which possess qualities that lead other species to gather around them in order to take advantage thereof, and who neither avoid these species nor take any notice of them. Examples are the greenshank and the curlew, who by a peculiar warning cry give the danger-signal to all the inhabitants of a locality. (4) Species which associate together pleasantly, the one having qualities by which the other profits. Examples, the godwit (*Limosa*), a genus of stilt-birds (*Hypsibates*), and the avocet; the first, which is more intelligent and more vigilant, ultimately acquires through these unions a considerable authority over the others. Another example are the unions in the marshes of Hungary between the heron, the ibis, the cormorant, the tern, the goose, and the pelican. (5) Sociable species in all their relations with their own fellows and with stranger species, without there appearing to be any interest on either side, the motive being absolutely the instinct of sociability. These are almost the same as those of the preceding fifth type: the passenger birds, the parrots, the Corvidæ, etc.

The last form of assemblages is for nesting in common. Fe-

males abandoned by their males immediately after rut sometimes *lay* their eggs all in one nest, not with a view of sharing the common burden but for the better defence of their eggs. The turkey is an example of this type, the male being the sworn enemy of its eggs. The polygamous females of the ostrich do the same, but for a different purpose. We can recall no example of females abandoned by their males actually *nesting* in common. On the other hand this practice is frequent in the second and third periods when the father participates in it. Examples are the gannet, the cormorant, the petrel, the swift, the chimney-swallow, the rook, the heron, the weaver-bird, the bee-eater, etc. At times a single species, and again different species, associate thus together.

Let us stop and consider a few cases. The gannets, one of those species which in other latitudes help to produce guano, have been described among others by Audubon as they live at the mouth of the St. Lawrence. They arrive from the South in successive flocks of from fifteen to one hundred and take up their abode on the islands there. Here they copulate and construct their nests, two feet apart in parallel rows. If one of the females steals the twigs of its neighbors, the others will all combine against her. When they brood the males hunt for them in the surrounding regions and on occasions will even sit themselves. Later, when the young are able to run about, or fraternise with one another, the nests are trampled upon and the lines effaced. At the end of four months about, all is finished, the young quit the rocks, emigrate, and do not return until the following year. Audubon also describes the nesting places of chimney-swallows, which are the same as tree-swallows, at least prior to the transformation of their instincts. These, too, are migratory birds, and form in their nesting places veritable societies. Audubon has counted fifty nests in the cavity of a sycamore tree and has seen as many as eleven thousand swallows repair nightly to this place in search of shelter. He saw as many as one thousand enter a chimney one evening.

The communal nesting-places of the heron (*Ardea*) of our country are extraordinary from another point of view. A more or less extended group of trees is chosen by them in a swampy country.

Thousands of couples repair thither, each tree supporting from fifteen to one hundred nests, together and at different heights with the nests of other species such as Nycticorax, Ardetta, Phalocrocorax, and Herodias. Nothing is more deafening than the hubbub which these various united species make. The most curious case is that of the weaver-bird (*Ploceus*) and particularly that of Philetærus. Levaillant, the South-African traveller, has counted as many as three hundred and twenty nests or couples on the same tree, and in this instance all of the same species. The nests touch and are covered by a sort of umbrella-like tent fastened in the branches. In these cases the subsequent life of the bird is not prejudiced. The Philetærus when its family is broken up returns to its old life with other and different species. In its social intercourse with these no trace survives of the families which temporarily existed in the previous state.

This leads us to close our remarks on birds by insisting on the facts relative to the varied influence which the family instinct exercises on the social instinct. It is certain that in a general way the species which are most sociable are also the most highly endowed with family qualities. And as examples we might cite the passenger birds, the Corvidæ, and the creepers. But a large number of species with a family turn are quite refractory to any kind of social alliances, as is the case with the Raptores. On the other hand the Gallinaceæ, who are considerably averse to family unions are strongly inclined to sociability whether with their fellow-birds or with other species. I need only recall the case of the wild duck who abandons his females and does not return until the young have grown up, but is yet extremely sociable. Of particular cases I may mention the water-hen, who has a strong family turn but forms neither sedentary nor migratory societies, and particularly the Molothrus, which lives a social life but has so little of the family sentiment as to be given to polygamy and polyandry, which, further, does not form couples, and whose female lays its eggs in the nests of others.

In another point of view, while the sexual instinct forcibly brings the sexes together, and the family instinct brings them to-

gether as a matter of option, on the other hand the sexes are frequently observed to separate in general life and to form distinct groups within the flock or apart therefrom. The young males themselves separate from the young females, who stay a much longer time with their mother. Thus in the pheasant, the young males quit their mother in the autumn, whereas the young females do not leave her until the spring. As to the natural duration of the family, which is fixed by the ability of the young to take care of themselves, we have already seen that it is sometimes abbreviated by the return of the sexual desire in the parents, who drive away their young *nolens volens*. Nevertheless, when there is but one brood a year, or where only the young of the last brood are concerned, there is a distinct tendency on the part of the young to remain longer in the society of their mother, who is then not opposed to their staying, or may be even desirous of it. Such is the origin of the coveys of partridges which pass with us the winter and do not break up until springtime, when rut returns. Coveys of this kind even join others and form multifamiliary societies. In the American ostrich (*Rhea*) this occurs; but the society has here little coherency; the members wander off or pass from one flock to another. In the great bustard several families join and form flocks amounting to several hundred individuals; but in the spring during the period of rut the society breaks up. The only case among birds favorable to the theory that the family is the nucleus of society, is that of the guinea fowl. It has from fifteen to twenty young for which both parents care. At the end of the season six or eight families are joined together, harmony reigns in the bosom of this little society, an old male governs it; and yet they do not know how to render each other mutual assistance in times of danger, but all flee in different directions. We shall conclude on this subject later.

Mammals.—These enlist our whole attention. They present all the forms of assemblages, of a more or less social character, which we have as yet encountered: indifferent, accidental, and temporary, for purposes of migration, for purposes of reproduction, sedentary, between different species, and for purposes of hibernation. Marine mammals, who have the same facilities for speedy

locomotion as fishes, bats which fly like birds, and certain Rodentia and Ungulata, offer examples of association for distant voyages. In the same order of facts, we may recall the short journeys which the marmots and chamois undertake in the winter from regions of snow to the valleys. The seals and the Chiroptera afford examples of distant journeys for reproductive purposes. We shall next say a word regarding assemblages for purposes of hibernation.

We have spoken of snakes and slow-worms (*Anguidæ*) who enter a state of torpidity during the winter, and who are found entwined in large masses in cavities and holes. Birds fly from the cold with too much facility to have any need of hibernation, and besides they are warm-blooded. In the lower mammals hibernation is pretty common, but only in individuals of solitary habits like the hedgehog, the shrew (*Sorex*), the dormouse (*Myoxus*), the hamster (*Cricetus*), and the harvest-mouse. Hibernation in common is rare, but occurs, for example, in the mole, who has a disposition to burrow in common, in the squirrel where the whole family burrow by the side of one another, but it is notably the case with the marmot. In the higher mammals a trace of hibernation, relating not to society but to family life, is observed in the white polar bear during the period of gestation. The female of the white polar bear digs a hole and, getting into it, causes herself to be covered by snow, staying so covered until spring. In short, hibernation points to nothing as regards the disposition of mammals to form societies.

In the lower mammals, such as the Monotremata, the Edentata, and the Insectivora, social troops are not formed at all. The majority, if not all, live solitary lives, and some are entirely wanting in the family spirit, as is the case with the porcupine ant-eater, the Armadillo, the ant-bear, the pangolin, the sloth, the tanrec, and the shrew, while others are less refractory in this respect, like the duckbill and the hedgehog. The aardvark (*Orycteropus*) is the only one of the Edentata that is met in twos or threes. The mole is the only one of the Insectivora who possesses any social instinct; each has its special burrow, but common corridors exist in which as many as fifteen to twenty individuals dwell.

In the Marsupials the progress is scarcely perceptible. The

majority live alone. Still, in the kangaroo-rat several congregate in a common burrow. In the common kangaroo we meet with indifferent assemblages; these animals graze together in bands numbering as high as eighty individuals, the same ones returning on the morrow either as before or with others as chance decides. Sometimes three or four evince a preference for one another, but no mutual interest. On the slightest occasion each one flees in his own direction without any attempt to join the troop again. And yet the kangaroo exhibits some susceptibility to education in the hands of man. All have heard of the kangaroo boxers.

In the Rodentia the progress is apparent. Some live solitary lives like the dormouse, the hamster, the porcupine, the jerboa, the hare, and the squirrel. The jumping-hare, it is said, lives in large families comprising several couples. In the South American rodent Lagostomus, a dozen families occupy the same burrow, over which a male watches and gives the signal in case of danger. The vole or meadow-mouse is very sociable and sometimes lives in large colonies, the burrows of which communicate with one another and are dug side by side in the same field. The voles, and particularly the lemmings, are celebrated furthermore in northern countries for their enormous emigrations. Their excessive fecundity enables them rapidly to exhaust a country, whereupon they set out in quest of new feeding grounds, in obedience to habits which have persisted for ages and frequently survived their reason for being. Mice and rats, as we know, gather in considerable numbers in localities favorable to their wants. Rats sometimes sleep in a sort of common nest, embracing to keep warm. At night they travel in troops, either in quest of new localities, or to make excursions in the open, all the while observing strict rules of prudence. Rabbits are divided into tribes occupying separate fields; each couple has its own burrow, connected with the others. They go out together in the morning and at night are watched over by an old male who apprises them of danger and urges on the stragglers. The marmots live together and have two kinds of dwellings,—one in summer on elevations, the other in winter in lower places, where they hibernate in common from seven to nine months. The prairie-dogs have

what the Indians call villages. Each has its burrow with well-kept winding pathways between; the lookouts show here and there their heads; they pay one another visits and play together; the habitation of some important personage being the main point about which their wanderings centre. If one of them is wounded or killed, another will quickly drag its body into the nearest burrow while the hunter is reloading his piece. Other and not less celebrated villages were those of the musk-rat and the beaver. The huts of the latter are grouped about a pond; all the members of the community join in cutting and hauling trees, in the constructing or repairing of dams, in digging canals, and in storing provisions. Their works are maintained from generation to generation, and from time to time the excess of the population move off and settle farther away.

The question may be asked with regard to the beaver, whether mutual assistance is the original motive of their living in societies, or whether this mutual assistance is a secondary outgrowth. In the prairie dog everything points to the conclusion that the desire for company is the sole motive. In the multitudinous swarms of lemmings necessity and imitation may account for everything.

The Chiroptera are allies of the Insectivora. They all live in bands which hibernate together and sometimes migrate from one distant isle to another. In France there are famous caves which bats have inhabited from time immemorial and where they have accordingly deposited a thick layer of guano. The interesting point in the history of Chiroptera is this: The females, having been abandoned by the males after rut, gather together in groups of a dozen each in some hole of the cave, where they give birth to their young and rear them in common.

The marine mammals present a similar case, which recalls the practice of communal nesting in birds, and which is complete, complex, and prolonged. We shall speak of them now, although in some respects they are allied to the Ungulata.

The marine mammals are all polygamus, with the exception of the walrus and the dugong, which are monogamous. They all live in herds. The whale is less social, often living a solitary life, yet

sometimes forming herds for the purpose of voyaging or of rut. Some assemblages, the main object of which is play and companionship, are also met with, as among the dolphins. There are also sedentary societies. Thus M. Trouessart speaks of a colony of seals who had taken up their abode in the Bay of the Somme. The five hundred sea-lions at the Golden Gate, near San Francisco, which are protected and fed, form also a sedentary colony. But the interesting groups, although difficult of explanation, are those which have the triple object of voyaging, companionship, and reproduction. Let us essay a sketch of them. These assemblages are composed, according to the season, of complete polygamous families, with a male swimming at their head, of groups of so-called solitary males, of groups of pregnant females, of groups of variously aged young, and of scattered bachelor males. Under what circumstances do these elements separate or come together? Let us abridge the description given of one of these species, the Arctocephalus or sea-bear of the Falkland Islands, by Steller and others.

In November, we are told, the old males arrive at these islands and scatter out on the beach in long files. In December the females arrive, and immediately violent combats are fought for their possession. The young males arrive several months later. At the end of April they all put to sea; in the middle of June the beach is deserted. So far, as I should judge, their conduct has reference solely to rut. The female has one to two young and carries them from eight to ten months, which brings us to the following season. The following, then, is the picture which is drawn for us. Each male has from three to fifteen, thirty, and even as many as forty females, and his entire family may amount to as many as one hundred and twenty individuals, which includes, surely, the young of one year. The beach is divided off into sections ten metres square, each occupied by a different family. The females pass their time in sleeping; the young play together like little dogs; the male is near at hand, and looks on; if the young ones come to blows he comes growling upon the scene, separates them, embraces them, and continues with them their game. If the females behave badly he chastises them; they crawl at his feet, seem to beg his pardon,

nd shed copious tears. At times males and females weep together. t a period which is not mentioned the old males separate and go way. A little later all of them quit the beach, each family swim-ing together. What happens afterwards? Do these families and e various other straggling groups unite and form assemblages mparable to herds or societies?

Among the mammals the Carnivora are the counterpart of the aptores among birds. They live on flesh, spread terror about em, are ferocious, and reap none but the fruits of egoism. In rd times they devour one another, and, when forced, to it, even t their females and their young. Nevertheless, some associations e formed among them having in view useful ends. At the head nd the Felidæ. These live alone or in couples, chance alone oc-sionally inducing some of them to unite for the purposes of chase. e leopard is met in troops of from six to eight. The Canidæ y. The Colsun of Deccan hunts in packs of from fifty to sixty lividuals, the dingo in families. The wild dogs of Constantino- and of Egypt are divided into tribes, each having its headquar-s and admitting no stranger. The jackal sometimes hunts alone, netimes in company. Wolves lead solitary lives in summer and nbine in winter into large packs. The blue fox of the poles lives packs, stations sentinels, but are not less unsympathetic for this son; they quarrel incessantly and engage in bloody combats. e Viverridæ live solitary lives. A species of the mongoose (*Her-tes*) and the daman (*Hyrax*), of Abyssinia, are often found to-ther, and give an instance of association between different spe-s. The Mustelidæ also live solitary lives; of these the badger is most egoistic specimen. There is one exception, however, the asel, which has a developed social instinct. Two or three stories ve been told about it in this connexion. A man once carelessly acked a weasel, who, driven to bay, uttered a war-cry to which enty weasels responded; these, issuing forth in all directions from eir burrows, charged the hunter and forced him to flee covered th wounds. This is solidarity. The Ursidæ live partly solitary es and partly in small troops. The coatis (*Nasua*) in this respect e of two kinds. One lives a solitary life when not in rut, and the

other lives in troops of from fifteen to twenty individuals, conducted by the oldest. But the harmony in these groups is far from perfect. The otters (*Lutra*), finally, live solitary lives, although in one marine species family life is, as we have already remarked, considerably developed.

The Ungulata are quite differently situated from the Carnivora. They are herbiverous, their food is obtained with a minimal effort and without strife. They pass a part of their time in ruminating with that serenity which every one has noticed. Their life has all the quietness and peace which Buffon regarded as the fundamental condition for developing the social spirit. They all live in small or in large herds, at times temporary but generally permanent, with regard to which the sole problem for us is to discriminate between what is accessory to the family and what is social. Some of them emigrate and their societies are then combined in greater or lesser numbers. Among the latter we will cite the reindeer who annually migrates from regions near the pole and returns there to obtain his favorite lichen in herds which have been known to reach one hundred thousand heads; the antelopes of Central Africa who go in quest of fresh pastures in herds numbering as many as fifty thousand heads; the buffalo who was formerly seen in incalculable numbers. A pioneer's wagon once took eight days to cross an unbroken column of bnffaloes.

In the Solidungula all three kinds of herds occur: family, social, and migratory. The first is simply the permanent polygamous family, such as we have described among the wild ass (*Asinus hemionus*) and the onager, and which, as we have seen, was created as much by the desire of the male to have about him a herd as by the sexual impulse. The second is a union of a larger or smaller number of such families; the number of individuals here amounts to hundreds in the so-called turpans or wild horses of Mongolia, and to thousands among the cimarones of La Plata. In the latter there is no observable leader. In the turpans there is also none; the command is collective and is lodged in the heads of the families. When the herd is attacked, they all form in a circle with the mares and the foals in the centre; their style of defence is methodical. The herd

is not a closed one; if a domesticated horse takes refuge with them he is cordially received. Nevertheless, stallions without females and young males likely to give umbrage to the old males are required to follow on one side. The third kind of herd is formed for purposes of migration, and may be either the one or the other of the two preceding kinds, but particularly the second, created or augmented as the circumstances demand. A fourth kind is also met with among some Solidungula and resembles that which we have so frequently encountered between different species of birds. The zebra is an example of this class. It comprises two species, the dauw and the quagga, of which rival herds, numbering from ten to one hundred individuals, do not mingle. One of these, the quagga, receives into its herds other species, such as the gazelle, the antelope, the gnu, and the ostrich. Is it need of company or utility which gives rise to these associations? As in the birds the most vigilant of this species act as guides, particularly the ostrich who is highly esteemed for his prudence and sharpness of sight.

The ruminants have the same kinds of associations. In the guanacos and vicugnas of the Cordilleras the herd resembles that of the wild ass. It is polygamous during the three periods of rut, gestation, and family life. The male is a chief of a herd, is jealous of the young males as they approach puberty, and is followed by his females and their young with devotion if not servility. In the mouflon two species behave differently. In the Tragelaphus of Africa all live solitary lives; when capable of reproduction the males approach the females in the season of rut, form with them a temporary polygamous herd and then abandon them, each resuming his old habits and the females being left alone with their young. In the musimon of Europe, permanent herds exist in which all ages and sexes are mingled. In the season of rut, the males form polygamous herds, with which they retire aside, whilst the remaining young males and females and the males without females select the oldest among them as their leader. When the season of rut is over, all rejoin the herd and pick out a general leader, the strongest and most esteemed among them. The females are merged in the general body, each having sole charge of her offspring. The males

evince no solicitude for the young, but assume their share of the collective responsibility and interfere in a body in times of danger.

Among the Cervidæ the monogamous reindeer is a type apart. There is a general herd in which all ages and sexes are mingled. Rut arrives; couples are formed which go aside on the approach of parturition, afterwards wander around with their little one until the latter has waxed strong, and then rejoin the troop where the family appears to be prolonged. There is a period, thus, at which the herd is represented solely by the young of both sexes. Outside, a few solitary individuals are found, old males which have been driven from the herd. There are several leaders who relieve each other; for example, in the nightly watch. In the stag (*Cervus*) the old solitary males are found isolated; the adult males are most frequently found forming a little herd apart; and the females with the fawns and the brockets are found united. In the season of rut the males capable of reproduction and the females come together and form a temporary herd whilst the celibates and other abandoned individuals gather in a second distinct herd over which they appoint a temporary chief. After rut, the solitary individuals return to their old ways of life; the most sociable of the males remain with their females for a longer or shorter period of time. In Capreolus this union is intimate and protracted. In the Capridæ the whole breaks up into polygamy at the period of rut. The herd is formed by the females and their young of all ages. As is the general rule, the grouty and ill-natured aged solitaries are expelled from the herd. In the Bovidæ the herd is formed upon the model of the European musimon. The male performs the sexual functions, deserts the female who joins her companions, and then assumes the post of chief of the herd in partnership with the other males, one of them being selected to discharge the principal rôle.

In the antelopes differences are observed. There is the herd of the gazelles numbering from forty to fifty individuals and formed of monogamous families; there is the polygamous troop of the capricorns (*Cervicapra*) in which the old females are utilised as sentinels; there is the temporary troop, during times of rut, of the chamois, and the migratory troops, numbering from ten to fifty

thousand heads, of the springbok. We even meet here with associations among different species.

The Pachyderms are the oldest of the Ungulata. Several are on the eve of disappearing, not only by the hand of man but by the law of evolution which requires that species which no longer conform to present conditions of life shall disappear. There is reason for believing that certain of these species formed anciently numerous societies of which we now possess barely the remnants. They all live in troops of from three to more in the tapir, of from four to twenty in the wild boar (*Sus scrofa*) and Phacochœrus, of from four to ten in the rhinoceros, of from three to four or from fifty to sixty in the hippopotamus, and from four or five to fifty and anciently to two hundred in the elephant. The three individuals to which reference was made in the tapirs appear to bear to one another no family relationship, but are rather an indifferent assemblage, such as we meet with in the kangaroo. In the hippopotamus the groups of three or four may constitute families, but the groups of fifty or sixty are certainly assemblages of families. Among the Suidæ, the twenty individuals which I once counted in the hog (*Sus*) correspond without doubt to a maternal family with the young of several farrows and not to a polygamous family, for the male is not at all sociable nor even disposed to make himself the chief of a herd. Assemblages of several polygamous families are met with among the peccaries of South America, concerning which we read: "they come in numerous herds, the male marching at the head and the females following, with the young in the rear."

The elephant may be seen in herds ranging from five to ten, to fifty, to one hundred and fifty, and formerly in one case, to two hundred. Each herd is a family into which no stranger is admitted. The unfortunate individual who has lost his herd or who has escaped from domestication is taken up by none of them. He is obliged to lead a solitary life. They allow him to approach and drink at the same spring, but they never permit him to mingle in the herd at large; thus he becomes ill-natured. The most prudent and most vigilant is chosen as the chief. Generally it is a male but sometimes it is a female; the chief is deposed when his capacities wane.

He has extensive authority and is always obeyed. He has been seen to station as many as five outposts around the herd to whom he gives his orders and whom he changes. Harmony reigns in this society. The cardinal point is that this herd is really a family, I might add, a large family composed of relatives of all degrees. My reasons for so believing is Tennent's statement that each of these herds can be recognised by special physical characters which are common to all. This is a certain proof of consanguinity.

These lines were already written when my friend M. Louis Rousselet, the author of *L'Inde des Rajahs*, informed me that the males were often found separately in small bands. This would indicate a resemblance to many ruminants like the deer and the big-horn. The males always show a tendency to assemble apart, as do the females with the young. This last division would be the repository so to speak, the centre of the community, its constant fraction.

The Monkeys, from whom we still exclude the anthropoids, offer us numerous examples of the fusion of family and social elements, as well as instances of polygamous troops in which the male is master, and also some cases of solitary monogamous life. Several of them undertake journeys, but they do not form special migratory bands.

The Lemurs may be seen according to circumstances in couples, in small families, or in troops. Thus the Maki by day sleeps rolled up in couples, and by night roams about in troops of thirty or more.

The Monkeys of the New World present all forms. The Nyctipithecus, as we have said, is monogamous, but does not form bands. The Mycetes lives in polygamous families of from three to ten members and has been seen in groups of forty, which points to the association of several families. The Ateles lives in small bands in which besides the young and the females are several males. The Cebus lives in large troops comprising both sexes which other kinds of monkeys sometimes voluntarily join. The Saki, the Callithrix, and the Arctopithecus also live in troops of varying magnitude, some forming but one family and others composed of several. In

both cases there is a chief who in the one is the father and in the other the male in highest esteem. The line of demarcation between the isolated polygamous family and the society is difficult to assign with the defective data now at our command.

As to the monkeys of the Old World no doubt prevails. All live in troops formed of banded families. Examples are the Semnopithecus, the Macacus, the Cercopithecus, and the Cynocephalus. The expeditions of Cercopithecus are well known. The strongest male is the chieftain and directs the movements of the troop, stations sentinels, is the first to advance, climbs trees to reconnoitre, accelerates the movements of the tardy, restrains the precipitate, exacts silence, and by divers grunts and growls issues orders which are both understood and obeyed. They all help one another, cleanse one another, and mutually extract thorns and slivers.

The Cynocephalus is more remarkable still. Brehm, who gained his experience of them in Abyssinia, describes their life in considerable detail. Their troops vary from fifteen to one hundred and fifty individuals, quartered in districts of from a mile to a mile and a half wide not far from a spring. We find together, for example, from twelve to fifteen old males and from twenty to thirty females, the rest being the young of different ages. In the morning, or if it rains, they may be seen in the highest galleries and cavities of the rocks massed together in a body, with the young supporting themselves by preference on their mothers, and the older ones on their fathers. Later, or if the morning is clear, they go in search of their breakfast, lifting the stones, tearing up roots, and gathering fruits. After breakfast they climb up again to the rocks, the males take their seats upon the flat slabs and silently contemplate the landscape while the females watch their infants play and quarrel. Towards evening they repair to the spring, seek their evening meal and then pass the night in an old or in some newly found lodging-place. Brehm describes their offensive and defensive tactics under the direction of a commander-in-chief, their habit of prolonged observation before making a decision, the daring of some of them in their bold dashes to extricate a comrade from danger, and their overawing by attitude and look the dogs of their pursuers

who flee forthwith and take refuge behind their masters. He speaks of their collecting stones at a given point to throw at their enemies, of their even carrying these missiles up trees, and of their aiding one another in rolling the largest of these. Harmony reigns in the bosom of these societies, but between different species as the Gelada and Hamadryas old scores are sometimes settled in free and open-handed combat. M. Mizon has encountered in the neighborhood of the Benue, bands of Cynocephali numbering as many as one thousand who would allow no other monkeys such as the Cercopithecus and Colobus in their domains. The most remarkable instances of co-operation which I know of in the Cynocephali is that which Romanes has reproduced—of a regular combat delivered at the Cape against English soldiers. There was a perfect hail of stones. An old grey-headed male directed the operations of the various squads according to the strategic needs. The English were forced to retreat.

In the Anthropoids our knowledge is far from what we should wish. Like the hippopotamus, rhinoceros, and so many other animals, they are gradually becoming extinct, and their present state gives us no indication of what they anciently were. If they live at this day little in social groups, it is likely because they are not numerous. The following is a summary of our knowledge of them. The gibbon and the chimpanzee love to play and frequently unite and render actual concerts by striking with clubs the branches of hollow trees. The gibbon has been seen in troops of from one hundred to one hundred and fifty. The orang-outang has little social instinct; he lives a solitary life when old, or as a member of a family. Wallace has seen a male or female accompanied with semi-adult young, or three or four infants together, but never two males together. The gorilla has been met by Duchaillu twice in bands of from eight to ten individuals. As to the chimpanzee there is the statement of Schweinfurth based on the accounts of natives that the young associate in small troops. But particularly valuable is the exact affirmation of Livingstone which we have already quoted, that one of these species, the Soko, lives in troops composed of monogamous families.

Conclusions.—The mammals, in the matter of society, do not offer the picture which as the successors of the birds we should naturally have expected. The sentiment which engenders the paternal-maternal and monogamous family in the birds is weakened and has been diverted in the mammals, where in most cases it gives rise to the paternal and polygamous family. Also the social sentiment, which most commonly engenders societies in birds, has been weakened and diverted in the majority of the mammals. As a rule the bird is more altruistic, the mammal more egoistic. In the birds the two sentiments of family and society are quite irregularly distributed in the different orders; in the mammals they form a scale running from zero in the lower orders to a high point in the monkeys. The natural linkage of the orders will perhaps explain these differences: they radiate in the birds, they proceed by steps in the mammals.

The lower mammals, such as the Monotremata, the Edentata, and the Insectivora, are hardly better endowed with regard to family than the reptiles. In the Marsupialia, the Carnivora lead a solitary life while the few herbiverous species that graze together are still in the indifferent period. The Chiroptera form a special group. They seem to crowd into caves, not from any social instinct but because they find there conditions suiting their individual tastes. In the Carnivora, though high up in the scale and in intelligence, there are no societies, properly speaking, but simply temporary assemblages, having as their object attack in common, in which ferocity takes the place of cordiality. In some Rodentia two forms of association are highly developed,—the one for migrations on a large scale, and the other sedentary for mutual help and companionship. In the marine mammals association is developed with the twofold end in view of migration and reproduction, in the latter case in the form of polygamous families. In the Ungulata association is generalised under the triple form of isolated polygamous families, of banded polygamous families, or of associated monogamous families, the first being under the direction of a chief who is necessarily the common father, the two others under the conduct of a single chief chosen from among the fittest, or under that of all

the old males, acting as a single person. In the monkeys the associated polygamous form is general but mingled with less spirit of domination and with more altruism in the male.

Among the birds we have noted (1) associations among different species both for companionship and for mutual service, as frequent here as they are rare among the mammals; (2) large temporary associations for migrations, general as a rule, but rare among the mammals; (3) sedentary and permanent associations, of a cordial, gentle, and ingenuous character, quite different from those ordinarily presented by the mammals. A few orders here and there may be made the subject of parallels. The Raptores among the birds and the Carnivora among the mammals are quite analogous. Egoism, monogamy, family spirit, and no social instinct are their common traits. The owl and the weasel are exceptions; both are sociable. The parrots and the monkeys likewise are counterparts. Clamorous, easily teased, high family spirit and sociability, concerted expeditions,—such are their characters. In certain societies of birds, as the rooks, the swallows, and the crows, there are indications of the formation of a species of tribunals for judging and punishing crimes and misdemeanors committed either within the flock or by strangers. In some mammals and notably in the monkeys, sentinels are said to have been punished for neglect of duty in permitting the troop to be surprised. It is certain that some mammals, like the domestic dog, the cat, and the elephant, have a confused but trustworthy notion of good and bad, of what is permitted and what is forbidden, and of what is just and what is unjust.

* * *

Let us summarise now some of our general conclusions.

1. All assemblages of animals, whatever may be the social form in which they have culminated, began as indifferent assemblages. Vague habits were unconsciously established between a few individuals; these habits were extended to others and even between different species. Pleasure resulted. The habits were confirmed, the pleasure grew. The social spirit was the result, it increased and led to organisations of life in common, often in the

roughest and crudest form, but furnishing the framework within which were developed the customs and characters leading up to those which may be observed in the society of man.

2. At their origin these assemblages, whether they were temporary or prolonged, had no object. Each obeyed his own caprice, the impulses and wants of the moment. Some individuals endowed with the spirit of observation, vigilance, and initiative ventured upon some act which the others imitated. Imitation is a powerful factor in all social and individual phenomena; one must be a physician to appreciate its full potency. M. Tarde has assigned to it an exceptional rôle in the life of man; M. Lebon has described its irresistibleness in the case of crowds. It intervenes incessantly and with more efficacy in animals where routine takes the place of reason. I shall always remember on the eve of the siege of Paris in 1870, the concourse of cattle which were gathered in the Bois de Boulogne. They wandered about dumbfounded. If one should start by any chance in one direction, a second, a third, then ten, a hundred, a thousand would blindly follow. The first pushed on by those behind seemed to be the chief, leading, although unconsciously, the entire troop. Hornaday has given a like description of the buffalo on the prairies. In this manner may be comprehended those astonishing migrations of immense bands of fishes, birds, and of some mammals. Chance crowned by success actuated the first, imitation drew after him the others. The habit once acquired the band was formed over again each year. There are migrations which have persisted for ages, although their original motive has ceased to exist. The instincts acquired are modified, transformed, and adapted to new conditions but with difficulty.

3. The causes of the formations of animal societies are numerous. The first is habit following upon indifference. The second is imitation. What shall we put third? We were prepared, we must avow, after our biological review of the conditions of the problem, to find always in the front rank of the facts, individual interest, egoism, that "categorical imperative" which forces the ego to comply forthwith with the physical exigencies of the organism which it represents. It is not so, and why? Because it is not logic that

determines most of the acts of an animal, but spontaneity. Without doubt, the first impulse of the animal touches his conservation; he flees by reflex action when a danger is presented; he throws himself upon his prey when he is hungry; he gives tooth for tooth when attacked. He avoids the traps which are set for him. But when that first impulse is past, under ordinary conditions, the other natural tendencies quickly regain the upper hand. He gives way to his sensibility, he does not reflect, he does not forestall. Between utility and what is pleasing, between the possible pain of to-morrow and the pleasure of to-day he is not long in hesitating.

The true cause of the formation of more or less sedentary and of permanent societies is that altruism which we have seen to be simply the love of self through others and which subsequently becomes a native sentiment as imperious under certain circumstances as egoism. It is the desire, the pleasure, the need of not being alone, of having companions, of exchanging with them one's impressions, of loving and being loved. There are two kinds of animals, those who in daily satisfying their alimentary needs are obliged to be constantly on the alert, defiant, and ready for combat; and those who having no ordinary ground for conflict give themselves up to the enjoyment of living and are naturally inclined to an existence of peacefulness and pleasure. The first are refractory to the social instinct, their egoism interferes. If they join in assemblages it is from necessity, accidentally and temporarily to hunt their prey. What they form is assemblages and not societies. The second kind, when once on the way, rapidly acquire social habits and progressively gain in altruism what they lost in egoism, coming finally into the possession of a social instinct which in many species is quite powerful. Our meaning is not that individual interest is not manifested in their societies, but that it is secondary there. They live together, they are exposed to the same difficulties of existence, and it is necessary that their action should be mutual and concerted. In the social weaver-bird as it is called (*Philetærus socius*), they have combined for the building of nests and for the rearing of the young side by side with one another; they have arrived, without a thought of the ulterior end, at the construction of

a common umbrella-shaped roof for their nests. The beavers most likely gathered together in social assemblages before they undertook the construction of their great works. The leaders which the majority of constituted societies appoint, the expeditions which parrots and monkeys organise, are the outcome of a common interest; but the societies in question were formed beforehand to satisfy the need of living in company.

In a word, sedentary societies, according to the theory which we present, took their rise in and were developed by the altruistic spirit. Individual interest by itself would never lead to anything consistent. Animals, contrary to certain appearances, as well as to the preconceptions of physiology and to ideas quite widely spread, are more sociable than egoistic. We judge them from our point of view. In this light, they are fierce and brutal; when their immediate material needs speak strongly in them, when their legitimate nervosity intervenes, they are violent, much to be dreaded, and quick in defence. But when these needs are subdued or are easily satisfied they are gentle, kind, and affectionate. The numerous species which man has succeeded in domesticating, from the lizard and the snake up to the elephant, are proofs of this. One must not be guided by particular cases, but must look at the facts in their general bearing. The animal is perhaps superior to man in point of altruism! Animal societies are less polished, but perhaps more humane, all things being equal, than our own.

4. We shall not dwell on the subsidiary causes which concur in the foundation of societies and which we have already discussed or touched upon incidentally,—the need of play and of outwardly venting one's surplus of vitality, the impulse to sing, to be noisy, or to be heard, the need of exercising authority, of being feared and admired, and conversely the need of being assisted, protected, petted, and loved. (See *The Monist*, 1896, p. 551.) We shall confine ourselves to our general conclusion regarding the influence of phenomena of reproduction on societies.

5. In the first period of reproduction everything is opposed to the social spirit. The male and the female flee from their fellows, retire aside, and recognise only themselves. The instinct which

presides at this period is egoistic to excess: the male must possess his female. Before reproduction he beats her when she does not yield with alacrity to his desires; afterwards he continues to beat her to assure himself of her being absolutely his. The solitaries are everywhere the most unsociable and the farthest removed from the family spirit even in those species where the adult males remain with their females. Nevertheless, they are the most ardent in the period of rut. In the second period, of brooding or gestation, when the male and the female have separated, both may enter the group of which they form parts; in the mammals the female never misses doing so. But when they remain together, the preceding situation is protracted, although it is less animal in form; they form a couple by themselves, have common joys, and experience no desire for comrades. In the third period two cases again are presented. When the family deprived of the male is maternal, at times the mother takes refuge in the general social group, seeking its protection, and at times she remains apart with her young who fill her whole existence. When the family, on the other hand, is paternal-maternal, the mother, satisfied with having a protector for herself and her young, has no other desire, while the father also is happy in the task which he fulfils. The happiness and egoism of two, which we observe in the preceding periods, have become the happiness and egoism of three. They are indifferent to everything which is not themselves. Nothing could be more contrary to the social spirit. Towards the end, however, the male gets surfeited with his task, wanders away more and more, and finally rejoins his companions, when his social instinct carries the day over his family instinct. At other times, when the young are definitively emancipated, he keeps on with the habits which he has acquired with his consort: family love disappears, conjugal love is left. They remain together, and the year following, throughout their whole life, they begin over again their romance of love and of family life. It is still the egoism of two individuals. The gain of this egoism is the loss of the social spirit.

So much for the monogamous family. Is it the same with the polygamous family? Let us explain first what is meant by the

word polygamy. It is applied vaguely to the three periods of reproduction and differs from promiscuity, which is sometimes improperly used. Promiscuity is free copulation, each one of the two sexes indulging in the function with equal rights and according to its caprice. It is divided into polygamy for the male and polyandry for the female. Polyandry is rare among animals; the infidelities committed by the female are less rare, but they are not uncommon. Generally the female gives herself absolutely for a whole season, and as a rule gives herself to one only. The male in polygamy does not give himself, he takes the females, and considers himself, so long as he is not satiated, as their master. If he remains polygamous in the second period, it is because he maintains his rights of proprietorship, and if he remains polygamous in the third, it is because he still maintains them by including the infants which are the issues of his females. But polygamy in the first period by no means determines his conduct in the second and third. A male may have an entire harem in the first and yet subsequently attach himself to but one female, discharging the duties of a father only with the infants of the latter, in a word, may be monogamous. Example, the little bustaıd or Tetrax. The opposite case is presented by the great bustard or Otis. The male has but one female, but as soon as this one has laid and has begun to brood, he goes in search of another and thus founds several families. In short, the polygamy whose influence we are here examining is not that of the first period, which is mere licentiousness, functional incontinence, as in the turkey and the goat, but that of the third period as in the seal or the elephant.

The conjugal and family ties are looser and consequently, as we have seen, less egotistical and less anti-social, according as they are more removed from monogamy. The more females and infants a family comprises, the more the total store of affection, attention, and protection of which the male is capable is weakened and dispersed. The more this family resembles a harem or a herd of which the male is sultan or chief, the more is it comparable to a little society under the conduct of a single leader. It is very difficult in the accounts of travellers to distinguish the simple numerous family

from the troop or herd of small dimensions. In the Ungulata, the polygamous family often comprises the young of two or three years, although a little later when they have become capable of reproduction their parents usually drive them away. But in other cases, as in the elephant, the young remain in the troop, procreate there, or more probably abandon the troop temporarily to return to it again with their young, with the result that in the end the herd is consanguineous and formerly often embraced as many as a hundred or two hundred members. It is certain that some societies of monkeys are simply augmented families of this kind.

Are polygamous families more capable than monogamous families of forming what Espinas calls *peuplades*, and which we regard as societies *par excellence?* This is the important point to know. Reason answers in the affirmative. Polygamy disperses the sentiment of sympathy, monogamy concentrates it. Polygamy is the egoism frequently of from fifteen to twenty individuals; monogamy is the egoism of three. We have seen numerous instances of polygamous families associating, as in the Tarpan and the buffalo; we have also seen monogamous families, as in the reindeer. But it is my opinion that the former are the most frequent.

We shall take it for granted, then, that polygamy tends more strongly to the formation of animal societies, than monogamy, although it is a lower form of family than the latter. A last reason tells us so. The family of three is a narrowed individuality, intermediary between the individual proper and social collectivity. The family of ten or twenty is a large and diffuse individuality, also intermediary but approaching to collectivity.

It remains to be seen whether, viewing the instrumentality of the young alone, the family favors the formation of society. We have seen, and only the fear of being too prolix has prevented us from dwelling upon it, that the young are invariably controlled by a single dominating tendency—the desire of getting out of their nests as soon as possible, of giving free vent to their activity, and of emancipating themselves, while braving unknown dangers and forgetting their parents. But we have also seen that they are possessed of a powerful impulse to play and to tease one another, to

cry out and to compete in song, even meeting from time to time in some common place for this purpose. To have comrades is a necessity with them. There exist, thus, two contradictory tendencies. The result in the young varies with the species, but in general the more the family state is prolonged the stronger does the habit of living together grow; the more they are conscious of their weakness, the more easily is their food obtained, as in the Herbivora, and the more they yield to the desire of being together; whilst under opposite conditions they abandon themselves readily to their instinct of liberty and of egoism. Nevertheless, small groups of young are formed for hunting in concert among the Carnivora; but occasionally more extensive groups, afterwards rallying to a general flock, are found among the Ungulata.

However a third factor is bound to intervene some day in the case of the young, which puts an end to their inclinations either for independence or for life in common—the arrival of puberty. Birds or mammals, all surrender themselves to the sexual instinct; the solidest ties are broken and the accomplishment of the first act of reproduction takes precedence over everything.

It is certain, however, that the spirit of sociability is most developed in the young who have not yet attained puberty, that it is maintained fairly well after the first rut and even after the first family state, and that it then wanes and quickly drops to zero in the aged males. "Solitaries" are met with in the most sociable species. They are the old males who have spontaneously abandoned life in common or have been expelled from the troop because they were grouty and ill-natured. Age is a factor which must be taken into account, both as regards family and as regards society, when a given species is to be judged. So for the rest there is sometimes wide variations of character, manners, and conduct within the same species. Two travellers may have expressed different opinions and yet both have made correct observations. In many cases it is the mean that has to be sought.

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To adhere faithfully to the plan which we sketched at the outset, whether it be right or wrong, it remains for us to compare

rapidly, not all the forms of association which the vertebrates have presented, but the highest among them, those which best merit the name of societies, with the associations[1] or colonies of lower and intermediary invertebrates.

1. Colonies form a whole, morphologically continuous in all their parts and at all the epochs of their evolution. Societies form diffuse wholes, having a virtual tie only.

2. Colonies tend towards a perfectly definite end, that of multiplying animal forms in time and on the surface of our planet, that of creating new organisms, more and more complex, at the expense of prior simple organisms. This end is wanting entirely in societies. However far solidarity may be carried it is impossible to conceive of a society becoming a new organism or being of any kind. What other end of evolution does it pursue?

As I take it, evolution has no end. It proceeds at random, essays and realises everything that it can, as we have before said, and scoffs at our teleological speculations. Nevertheless, it cannot be denied that among its various operations, regressive, indifferent, and progressive, we are most vividly struck by those which best succeed, by those which engender that admirable harmony revealed by philosophers and lauded by poets. Progressive evolution follows one direction—the *best* by comparison with what has preceded, the best for the species, considering the conditions in which its lot is cast. One of these *best*, as physics and economics have taught us, is the maximum output with a given instrument or organism. We have seen that for the functions of reproduction, progress, amidst attempts of all kinds, has always tended in this direction. Among the fishes we had quantity, but the majority perished; in the higher mammals we had quality, that is, a less number with survival assured. As to the functions of outward life, the same end has been set. Creatures were multiplied in superabundance; what was required was that they should become perfected, that the species should individually yield the maximum output, that is to say,

[1] Evolution has other ways of forming or developing metazoans of increasing degrees of complexity. But the method by organic association is the most widely diffused and the only one which relates to our subject.

that they should exhibit the maximum of activity, of enjoyment, of prosperity, and of well-being. Hence resulted the process of virtual association among demes which evolution follows by habit, and which leads to the strengthening of the ties between the individuals of a species, to their living better, and to the bestowal upon them of more power. By the family, evolution ended in better progeny; by society, it ended in a greater amplitude of life for the species.

The two first differences, in fine, create an abyss between colonies and societies. Comparison seems impossible. But let us continue.

3. In colonies aggregation at first acts by adhesion between individuals which have come from without or are the issue of a common mother; growth is effected by gemmation; total reproduction by the separation of one part, the rest perishing.

In societies aggregation acts by exterior adhesions or by consanguinity; growth by a sort of hypergenesis; reproduction by the separation of a part or swarm, the remainder continuing to live. The parallel is difficult.

4. In colonies division and specialisation of labor are promptly established and more and more accentuated. The individuals form groups which become organs, each concurring within the limits of its specialty in the fulfilment of the general wants. In societies it is the same, each individual is specialised, groups are formed, that is to say, categories; some are favored, others are sacrificed; a hierarchy is established. This is the feature of formal resemblance and one which should be emphasised.

5. In colonies the individuals preserve their independence only for a short time. They almost immediately make concessions to their neighbors, then to groups, and finally to the colony entire; so much so that their individuality becomes entirely absorbed, and they retain no other functions than that of cog-wheels in a great machine. In societies a certain sacrifice of individual independence is also required. The social state is an exchange of concessions; we give in order to receive. But there is a limit; one always preserves the greatest part of one's individuality; one is not bound to

suffer oneself to be absorbed, whatever be the degree of solidarity. This difference is profound.

6. Colonies are presented in the invertebrates in all periods from simple assemblages of individuals with scarcely any adhesion up to complete and absolute solidarisation. We may reduce them hypothetically to three periods. In the first, the individuals still remain their own masters, they lead their own life, and the colonial whole is but their numerical sum. In the second, they have lost half of their individuality, and the colonial whole possesses the other half. In the third, the individuals no longer count as such; they are subordinated to the colonial whole, which wields all the power and all the initiative. In which of these three periods would animal societies fall, on the supposition that we are obliged to class them with colonies, and that we admit they will develop like them in the course of time and in the ascending mammalian scale? In the first, with traces of a tendency here and there towards the second.

In fine, the classing of colonies with societies, which the positivists hold as proper, is a pure fiction, although in some points resemblances exist. If certain laws are applicable to like phenomena in the two orders of association, it is because the grand laws of nature are universal in character and relate as well to sociological or biological facts as to physical, chemical, or astronomical. The plain truth is this: the variously graded associations called colonies are morphological; the associations between demes are virtual. The first create new species, the second perfect them, extend and develop all that they can produce. Will this evolution culminate in the greatest intrinsic good of this or of that species, or in its complete annihilation by very excess of vitality? That is the secret of time. It remains to be learned whether man is situated in this regard the same as the other animals, whether his peculiar attributes do not transform the situation, and whether consequently he will not suggest some modifications of the outlooks gained in the present study.

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THE PHILOSOPHY OF BUDDHISM.

ORIGINAL DUALISM.

Buddhism originated, as all religions do, from the desire to escape the transiency of life with its incidental vicissitudes and to attain the permanent and enduring bliss of an undisturbed existence where there is no pain, no disease, no death, no incertitudes of any kind. As soon as the prevalence of suffering was recognised as an inalienable condition of bodily existence the first attempt at obtaining deliverance from evil was naturally made by a mortification of the body for the sake of benefiting the soul. The body was looked upon as the source of all misery, and a purely spiritual existence was the ideal in which religious men set their hope of salvation. The body is doomed to die, and was therefore considered as an animated corpse. Our material existence is a body of death of which man must rid himself before he can obtain the deathless state. Thus we read in the story of Sumedha, which serves as an introduction to the *Jatakas:*

"Even as a man might rid him of
A horrid corpse bound to his neck,
And then upon his way proceed,
Joyous, and free, and unconstrained;

"So must I likewise rid me of
This body foul, this charnel-house,
And go my way without a care,
Or least regret for things behind.

"As men and women rid them of
Their dung upon the refuse heap,

And go their ways without a care,
Or least regret for what they leave;

"So will I likewise rid me of
This body foul, this charnel-house,
And go my way as if I had
Cast out my filth into the draught."[1]

Sumedha says:

"What misery to be born again!
And have the flesh dissolve at death!

"Subject to birth, old age, disease,
Extinction will I seek to find,
Where no decay is ever known,
Nor death, but all security."[2]

The ideal of Buddhahood, accordingly, was in its original shape the attainment of a purely spiritual condition which it was hoped would afford a perfect emancipation from suffering. It was the same yearning as that of the early Christians, expressed in St. Paul's words:

"O wretched man that I am! who shall deliver me from the body of this death?"

Even Luther, with whom the monistic era of Christianity begins, speaks of his body with the utmost contempt. The term *Madensack*, i. e., a bag full of food for grubs, is a favorite expression of his.

The religious problem, as it presented itself to the ascetic Gautama before he had attained to Buddhahood, was formulated on dualistic principles, but his final solution rested upon a monistic basis. We know little of his philosophical evolution and the phases through which he passed; but the outcome is unequivocal in all important questions that form decisive test-issues as to the character of his system. He was tolerant and showed extreme patience with all kinds of mythologies, even utilising the supersti-

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[1] H. C. Warren, in his *Buddhism in Translations*, pp. 7–8. See also the passage quoted from Chapter VI. of the *Visuddhi-Magga*, p. 300.

[2] *Ibid.*, p. 6.

tions of his age to the enhancement of his religion, but he was merciless in his rejection of metaphysicism and dualism.

ANTI-METAPHYSICAL.

After Buddha had surrendered the old dualism, the traditional formulation of philosophical problems lost their meaning; they became what we now call illegitimate questions; and whenever Buddha was confronted with such illegitimate questions, he either refused to answer them or declared openly: "The question is not rightly put."[1] His refusal to answer such questions, which on his plane of thought had become unmeaning and irrelevant, nay, even misleading, can be interpreted as agnosticism, or as a dodge and attempt at straddling, only by those who utterly misconceive the spirit of Buddha's doctrines. When bored with questions by a wandering ascetic, one of those frivolous wranglers who dispute merely for the sake of discussion, Buddha refuses to answer, but when afterwards Ânanda accosts his master he explains why the wandering ascetic received no reply. The reason is here again the error involved in the wrong formulation of the question. Thus if he had replied in the negative, saying that the âtman does not survive death, the wandering ascetic would have said "the Buddha teaches that there is no after-life"; and if he had replied in the affirmative, saying that the âtman survives death, the implication would have been that Buddha believed with the Vedanta philosophers in the existence of an âtman.

Buddha's monism is not materialism; he does not identify soul and body, he only denies the separate existence of soul-entities. There is soul and there is body. There are consciousness-forms and bodily-forms, and both are changing and developing, both are subject to growth and decay. The body is dissolved, and consciousness passes away, yet their forms reappear in new incarnations. There is death and rebirth, and there is continuity of life with its special and individual types. If the soul were identical with the body, it would perish with it; if it were a distinct entity and an immutable âtman, it would not be affected by conduct and

[1] See, for instance, Warren, *Buddhism in Translations*, pp. 167 and 312.

there would be no use in leading a holy life. In either case there is no need of seeking religion. Buddha's solution is, that there are not two things (1) an âtman and (2) the deeds performed by the âtman, but there is one thing—a soul-activity (karma), which operates by a continuous preservation of its deed-forms or samskâras, which are the dispositions produced by the various functions of karma. There is not a being that is born, acts, enjoys itself, suffers and dies and is reborn to die again; but simply birth, action, enjoyment, suffering, and death take place. The life-activity, the deeds, the karma, the modes of motion in all their peculiar forms, alone are real: they are preserved and nothing else. Man's soul consists of the memory-forms, or dispositions, produced by former karmas. There is no self in itself, no separate âtman; the self consists in the deed-forms, and every creature is the result of deeds.

The disciples propose to the Blessed One in the *Samyutta-Nikâya* this question:

"Reverend Sir, what are old age and death? and what is it has old age and death?"

The Blessed One replies:

"The question is not rightly put. O priest, to say: 'What are old age and death? and what is it has old age and death?' and to say: 'Old age and death are one thing, but it is another thing which has old age and death,' is to say the same thing in different ways.

"If, O priest, the dogma obtain that the soul and the body are identical, then there is no religious life; or if, O priest, the dogma obtain that the soul is one thing and the body another, then also there is no religious life. Both these extremes, O priest, have been avoided by the Tathâgata, and it is a middle doctrine he teaches: 'On birth depend old age and death.'" (*Buddhism in Translations*, p. 167.)

PERSONALITY.

But considering the practical importance of personal effort in moral endeavor, how can the denial of the existence of a separate self as the condition of personality be useful in religion?

The answer is, that the denial of the existence of a separate self, an âtman, is not a denial of the real self such as it actually ex-

ists in man's personality. There is no chariot in itself, but there are chariots; there are no persons in themselves, but there are persons. Buddha does not intend to wipe out the personalities of man, but only the false notion of the metaphysical character of personality. Not only did Buddha always endeavor to adapt his teachings to different personalities, but we find generally in Buddhism as much stress laid upon the personal relation of a disciple to the master, as by Luther, who used to say that "it is not enough for a Christian to know that Jesus Christ is the Saviour, he must experience the fact in his heart and must be able to say, 'Jesus Christ has come to save me individually.'"[1]

There is a similar aspiration in Buddhism, which Buddhagosha, in his comments on the Dhammapada, expresses as follows:

"Now when a Supreme Buddha teaches the Doctrine, those in front and those behind, and those beyond a hundred or a thousand worlds, and those even who inhabit the abode of the Sublime Gods, exclaim: 'The Teacher is looking at *me;* The Teacher is teaching the Doctrine to *me.*' To each one it seems as if the Teacher were beholding and addressing him alone. The Buddhas, they say, resemble the moon: as the moon in the midst of the heavens appears to every living being as if over his head, so the Buddhas appear to every one as if standing in front of him." (*Buddhism in Translations*, p. 470.)

Far from being an obliteration of individuality, the denial of the âtman actually involves a liberation of individuality from an error that is liable to stunt all mental growth and hinder man's free development. Buddha takes out of life the vanity of self, which is based upon the dualism of âtman and karma as separate realities. There is no need of bothering about an âtman, but it is important to be mindful, thoughtful, and energetic in all that a man undertakes and does, for the karma is the stuff of which a man is made. One's own personal endeavor and achievements constitute one's personality, and this personality is preserved beyond death, as we read:

"But every deed a man performs
With body, or with voice, or mind,

[1] "Darum ist's nicht genug, dass einer glaubt, es sei Gott, Christus habe gelitten., u. dergl., sondern er muss festiglich glauben, dass Gott ihm zur Seligkeit ein Gott sei, dass Christus für ihn gelitten habe, etc." (Quoted by Köstlin in his *Luther's Theologie.*) Similar passages are frequent in Luther's writings.

'Tis this that he can call his own,
This with him take as he goes hence.
This is what follows after him
And like a shadow ne'er departs."[1]

These lines have reference to the parable of the man whom his family, his friends, and his property leave when he is cited before the judge, while his good deeds alone follow him through the gate of death and plead for him. Speaking without allegory, we ought to say that the deeds, or rather the deed-forms, are the man himself.

There is no duality of a doer and his doings, a thinker and his thoughts, an enjoyer and his enjoyments, a sufferer and his sufferings, an aspirer and his aspirations. There is not an âtman that performs karma; but there is karma which, wherever incarnated in an individual group, appears as an âtman. The words doer, agent, enjoyer, etc., are mere modes of speech. The realities of soul-life consist in doings, thoughts, sufferings, enjoyments, and aspirations. Actions take place, and the peculiar form of every action is preserved as an analogous disposition to repeat that same action in the shape of memory-structures; and all living beings start life as the summed-up memory of their deeds in former existences.

THE DEATHLESS.

There is no âtman-soul; accordingly there is no transmigration of an âtman-soul; yet there is rebirth: there is a reincarnation of the ancestral karma by a preservation and reproduction of the soul-forms transmitted from generation to generation.

Here we must make a distinction between pure forms and materialised forms. By the pure form of a right-angled triangle we mean the mathematical conception in its abstract and absolute distinctness. The relations of the angles and sides are definite conditions of unalterable rigidity. They can be formulated in theories which are readily recognised as eternal verities. The materialist who believes that material bodies alone are real, would say that pure forms are non-existent, but the mathematician knows that a

[1] *Buddhism in Translations*, p. 228.

right-angled triangle is a definite actuality which, whenever an occasion arises, will manifest itself with unfailing exactness. Manifestations of right-angled triangles take place in materialised forms, by which we mean some single drawing made in ink, pencil, or chalk, or a relation obtaining somehow among three points represented by the centres of stars or indicated by rays of light. The actualisation of a pure form may be more or less perfect, but it always exemplifies the laws of pure form and is, so to speak, its incarnation. In this sense Plato speaks of ideas as being above time and space, and Schiller sings of the higher realm of pure forms:

> "In den höheren Regionen
> Wo die reinen Formen wohnen."

For ethical considerations man must learn to identify himself, not with the materialisation of his thought and aspirations, but with their forms; for the former are transient, the latter eternal. He must let go all attachment to the special and particular embodiment in which his soul appears. He must find his anchorage in that which cannot be destroyed but will last for ever and aye. The pure forms of his soul-being must be understood as possessing him, they shape his brain, the nervous structures of his thoughts, the materialised forms of his sentiments and aspirations; they dominate his life, his energies, his everything, but not *vice versa:* his bodily incarnation does not lord it over the eternal type which in him becomes manifest. The material elements do not possess the directing faculty, for direction is a formal principle.

In this sense Christ existed since eternity as the divine Logos and became flesh in Jesus; and Buddha descended from the Tusita Heaven to earth for the purpose of being incarnated in the son of Mâya. In this same sense Buddhists speak of attaining to the Bôdhi, i. e. enlightenment or Buddhahood, which implies that the Bôdhi existed before Gautama found it. In the same sense, the right-angled triangle and its law existed before Pythagoras; he did not invent the theorem that bears his name: he discovered it. The idea of a right-angled triangle with all its essential relations dawned upon him, became incarnated in him, manifested itself in him.

But here we must pause a moment, for here lies a difficulty which has greatly embarrassed the translators of Buddhist scriptures. The Pâli word *rupa* means "form," but it is frequently used in the sense of materialised form (*rupa kayo*), not only in the sense of pure form; indeed, it must sometimes be translated by body. Thus that which Plato and Schiller would call pure form is in Pâli called *arûpo*,[1] "that which is without *rupa*, the bodiless," commonly translated "the formless."

We read in the Buddhist scriptures that the attainment of Nirvâna is not possible unless we comprehend "the formless," which is the unmaterial, the eternal, the deathless. This deathless, this unmaterial, this "formless," or rather this eternal realm of pure form the *arûpaloco* is not an essence, not an entity, not an individual being or a personal deity; it has no special dwelling, nor is it a locality, or a heavenly abode; and yet it is the most important truth to be known.

"There is, O disciples, something not-born, not-originated, not-made, not-formed. If, O disciples, there were not this not-born, not-originated, not-made, not-formed, there would be no escape for the born, the originated, the made, the formed." *Udâna*, VIII., 3.

The deathless is a mere nothing, if "nothing" means absence of materiality, and yet it is the most important factor of life, for it makes enlightenment possible and is the condition of salvation. In the *Majjhima Nikâya* (Sutta 26), in which Buddha declares that "the deathless has been gained," the theory is set forth that the "Nothing" is not a nonentity, but that it exists; and "of the priest who dwells in the realm of nothingness" it is said that "he has blinded Mâra, made useless the eye of Mâra, gone out of sight of the Wicked One."

He who clings to bodily form, i. e., the materialised incarnation of pure form, and identifies his self with this compound of atoms, this aggregation of material elements, is not free from the illusion of selfhood; he has not found the eternal resting place of

[1] Also spelt âruppo and arûpe. The neuter of arûpo (arûpam) is used as a synonym of Nirvâna.

life; the bliss of Nirvâna, the peace of his soul; he is driven round in a whirl of eternal turmoil, in the saṃsâra of worldly interests, in aspirations for transient goods.

He who has attained *arúpam*, the formless, surrenders with it all petulancy of self, for jealousy, spite, hatred, pride, envy, concupiscence, vainglory—all these and kindred ambitions—have lost their sense. He is energetic, but without passion; he aspires, but does not cling; he administers, but does not regard himself an owner; he acquires, but does not covet. This is expressed in the *Milindapañha*,[1] where we read:

"Said the king, 'Bhante Nāgasena, what is the difference between one who has passion and one who is free from passion?'

"'Your majesty, the one clings, the other does not cling.'

"'Bhante, what do you mean by "clings" and "does not cling"?'

"'Your majesty, the one covets, the other does not covet.'

"'Bhante, this is the way I look at the matter: both he who has passion and he who is free from passion have the same wish, that his food, whether hard or soft, should be good; neither wishes for what is bad.'

"'Your majesty, he that is not free from passion experiences both the taste of that food, and also passion due to that taste, while he who is free from passion experiences the taste of that food, but no passion due to that taste.'"

THE MIDDLE DOCTRINE.

Buddha calls his solution of the psychological problem the middle doctrine, because it avoids both extremes of what, in the terms of the schoolmen, may be called extreme Realism and extreme Nominalism. Buddha denies that there are things in themselves of any kind. Compounds have no existence outside their parts, and man, like other things, animals, plants, chariots, worlds, etc., is a compound. There is no self in man as a separate entity. Self denotes the whole man. He who says compounds are things in themselves is mistaken, but he who denies the existence of compounds, he who proclaims the doctrine of non-existence is mistaken also. Compounds are real enough, the relation among things and their interaction are not mere illusions. While there are no things

[1] Quoted from Henry Clarke Warren, *Buddhism in Translations*, p. 421. See also *Sacred Books of the East*, XXXV., p. 119.

in themselves, there are forms in themselves. Buddhagosha argues in the *Visudhi-Magga*, Chap. XVIII.:

"Just as the word 'chariot' is but a mode of expression for axle, wheels, chariot-body, pole, and other constituent members, placed in a certain relation to each other, but when we come to examine the members one by one, we discover that in the absolute sense there is no chariot; and just as the word 'house' is but a mode of expression for wood and other constituents of a house, surrounding space in a certain relation, but in the absolute sense there is no house; and just as the word 'fist' is but a mode of expression for the fingers, the thumb, etc., in a certain relation; and the word 'lute' for the body of the lute, strings, etc., 'army' for elephants, horses, etc.; 'city' for fortifications, houses, gates, etc.; 'tree' for trunk, branches, foliage, etc., in a certain relation, but when we come to examine the parts one by one, we discover that in the absolute sense there is no tree; in exactly the same way the words 'living entity' and 'âtman' are but a mode of expression for the presence of the five attachment groups, but when we come to examine the elements of being one by one, we discover that in the absolute sense there is no living entity there to form a basis for such figments as 'I am' or 'I'; in other words, that *in the absolute sense there is only name and form*. The insight of him who perceives this is called knowledge of the truth." (*Ibid.*, p. 133.)

As soon as we abandon the middle doctrine and assume the existence of a self which is supposed to be an entity that is in possession of all the parts of a compound, we must either assume that this entity after the dissolution of its parts will persist or that it will perish; and both views are erroneous because they start from a wrong premise. He who imagines that his self is immortal is mistaken and will cherish foolish ideas as to the mode and place of its future residence. But he who thinks that his self will perish is not less mistaken; he is unnecessarily afraid of death, for there is no self that can perish. Both propositions are senseless, because based on the illusions of either an extreme realism or an extreme nominalism.

He who sees things as they really are ceases to cleave to existence; he does not think that sensation or thought or any one of the aggregates is the âtman, but for that reason his personality is not wiped out.

"He ceases to attach himself to anything in the world, and being free from attachment, he is never agitated, and being never agitated, he attains to Nirvâna in his own person." (*L. c.*, p. 137.)

NOT A DOCTRINE OF ANNIHILATION.

If man is "name and form" and no self in itself, the proposition seems to suggest itself that death ends all; but the doctrine of annihilation is not countenanced by any of the orthodox Buddhists. We read in the *Saṃyutta Nikaya* (XXII., 85):

"Now at that time the following wicked heresy had sprung up in the mind of a priest named Yamaka: 'Thus do I understand the doctrine taught by the Blessed One, that on the dissolution of the body the priest who has lost all depravity is annihilated, perishes, and does not exist after death.'" (*L. c.*, p. 138.)

And a number of priests who had heard the report drew near and said:

"Say not so, brother Yamaka. Do not traduce the Blessed One; for it is not well to traduce the Blessed One. The Blessed One would never say that on the dissolution of the body the saint who has lost all depravity is annihilated, perishes, and does not exist after death." (*Ibid.*)

Then Shâriputra instructs Yamaka by teaching him that there is no such a being as a saint or a man in himself, for all his constituents are transitory and cannot be regarded as his âtman or enduring self; the saint is not bodily form, not sensation, not perception, not any of the predispositions, not consciousness. How then can the saint be annihilated in death? All the constituents of the saint depend upon causation, but holiness and enlightenment are the deathless state which is not touched by death. The *Visuddhi-Magga* comprises this doctrine in these four lines, which sound almost paradoxical:

"Misery only doth exist, none miserable.
No doer is there; naught save the deed is found.
Nirvâna is, but not the man who seeks it.
The Path exists, but not the traveller on it."[1]

And is Nirvâna non-existence? Not at all. It is the attainment of the deathless state, of immateriality, of pure form, of eternal verity, of the immutable and enduring, where there is neither

[1] *L. c.*, p. 146.

birth nor death, neither disease nor old age, neither affliction nor misery, neither temptation nor sin.

"'Wherein does Nirvâna consist?' And to him, whose mind was already averse to passion, the answer came: 'When the fire of lust is extinct, that is Nirvâna; when the fires of hatred and infatuation are extinct, that is Nirvâna; when pride, false belief, and all other passions and torments are extinct, that is Nirvâna." (*L. c.*, p. 59.)

He who attains Nirvâna continues to exist in his personal identity as pure form of a definite character, but he is without any trace of clinging to a particular incarnation. Thus he is no more reincarnated in any special individual, and this is the sense in which Buddha has passed away and yet continues to exist in his bodiless personality, as we read in the *Milindapañha*[1]:

"The king said: 'Is there such a person as the Buddha, Nâgasena?'

"'Yes.'

"'Can he then, Nâgasena, be pointed out as being here and there?'

"'The Blessed One, O king, has passed away by that kind of passing away in which nothing remains which could tend to the formation of another individual. It is not possible to point out the Blessed One as being here or there.'"

THE CONQUEST OF DEATH.

The surrender of the self-illusion with its pretensions brings us practically to the same maxim of life which St. Paul sets forth in 1 Cor., vii., 29–30:

"But this I say, brethren, the time is short: it remaineth, that both they that have wives be as though they had none.

"And they that weep, as though they wept not; and they that rejoice, as though they rejoiced not; and they that buy, as though they possessed not."

This view does not lead to the neglect of the body, but to its being subservient to higher ends and a nobler cause. The Buddha compares the body to a wound which we nurse although we do not love it. Nâgasena says:

"They who have retired from the world take care of their bodies as though they were wounds, without thereby becoming attached to them. (*Buddhism in Translations*, p. 423. Compare *Sacred Books of the East*, XXXV., p. 115.)

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[1] See *Sacred Books of the East*, XXXV., pp. 113–114.

All vicissitudes and afflictions affect the bodily incarnation, not the eternal soul, the pure form or the arúpam, or bodiless, i. e., that which is without rupa; and thus the Saṃyutta Nikâya declares that the saint may be "wretched of body" but can never be "wretched of mind." The actuality of the world, the material reality of existence, the samsâra is absolutely void of permanency. All is transient and nothing endures. Therefore he who sets his heart on anything of the world or its various realisations of form, is sure to suffer; while he who has understood the emptiness of all material existence seeks refuge in the eternal Nirvâna, the domain of eternal verities which, in comparison to bodily realisations, constitute the Void, the Nothing, the existence-less. The eternal verities are immanent in all reality and condition its evolution; they are the aim and purpose of life; they are, to use Goethe's words, "the unattainable of which all actual things are but symbols." They are the nothingness of which we read in the *Majjhima Nikâya* (Sutta 26), that he who dwells in it is "out of the reach of Mâra," the Evil One.

"He has blinded Mâra, made useless the eye of Mâra, gone out of sight of the Wicked One." (*Ib.*, p. 348.)

An ancient Pâli verse (preserved in the *Udâna*, IV., 4) characterises this condition as follows:

"The man whose mind, like to a rock,
Unmovèd stands, and shaketh not;
Which no delights can e'er inflame,
Or provocations rouse to wrath—
O, whence can trouble come to him,
Who thus hath nobly trained his mind?"[1]

The belief in self, a separate soul-entity or âtman, is the most serious obstacle to the attainment of the eternal and deathless, because the thought of self infuses all creatures with fear of dissolution as well as a desire for this particular and special copy of its own eternal being. The *Visudhi-Magga* (the Book on the Path of Purity) dwells on the subject in Chapter XXI., where we read:

[1] *Buddhism in Translations*, p. 315.

"To one who considers them [the constituents of being] in the light of their transitoriness, the constituents of being seem *perishable*. To one who considers them in the light of their misery, they seem *frightful*. To one who considers them in the light of their want of an Ego, they seem *empty*.

"He who considers them [the constituents of being] in the light of their transitoriness abounds in faith and obtains the *unconditioned* deliverance; he who considers them in the light of their misery, abounds in tranquillity and obtains the *desireless* deliverance; he who considers them in the light of their want of an Ego, abounds in knowledge and obtains the *empty* deliverance." (*Ib.*, p. 379.)

This is said to explain the stanza:

"Behold how empty is the world,
Mogharâja! In thoughtfulness
Let one remove belief in self
And pass beyond the realm of death.
The king of death can never find
The man who thus the world beholds."[1]

MODERN PSYCHOLOGY.

The world has been greatly astonished in these latter years by the results reached by modern psychologists, Herbart, Fechner, Weber, Wundt, Ribot, etc., who have arrived at the conclusion that there is no soul-being, a theory which received the paradoxical name of "a psychology without a soul." The name is misleading, for the truth is that modern psychology discards the metaphysical conception of the soul only, not the soul itself. The unity of the soul has ceased to be a monad, an atomistic unity, and is recognised as a unification. The personality of a man is a peculiar idiosyncrasy of psychic forms, a system of sensations, impulses, and motor ideas, but it is not a monad, not a distinct entity, not a separate unit. In a word, there is no soul-entity, or soul-substance, or soul-substratum, that is possessed of sensations, impulses, and motor ideas; but all the sensations, impulses, and motor ideas of a man are themselves part and parcel of his soul. Mr. Hegeler expresses it by saying: "I have not ideas, but I am ideas."

The modern theory of the soul is not quite new, for it was clearly outlined by Kant, who counted the notion of a distinct ego-soul as a contradiction, or, as he termed it, one of the paralogisms

[1] *Ib.*, p. 376.

of pure reason. He did not exactly deny the separate existence of an ego, by which he understands apperception as a unit, viz., self-consciousness, but he proved the inconsistency of the assumption and retained the notion only on practical grounds, because he argued that the ego-conception is an idea without which ethics would fall to the ground. Theoretically he rejected the existence of an ego-soul, but for the sake of morality he retained it as a postulate of practical reason.

The ego-soul is nothing but the ancient and famed thing-in-itself in the province of psychology. Metaphysicians of the old school believe that philosophy consists in the search for the thing-in-itself, while the new positivist abandons the idea that there is a separate entity behind or within the parts of things. There is no watch-in-itself; but a peculiar combination of wheels and other mechanical contrivances, together with a dial and the movable hands on the dial, is called a watch. This is as little a denial of the existence of watches as the new psychology is a psychology without a soul. Yet the enemies of the new positivism will still insist that the denial of things-in-themselves implies a philosophical nihilism.

But the new psychology is older still than Kant. As the doctrine of a separate soul prevailed in India among the Brahmans, so the denial of the existence of a separate soul was pronounced more than two thousand years ago by that school of thought which under the leadership of the great Shâkyamuni grew up in opposition to Brahmanism and became known by the name of Buddhism. Not only are the similarities that obtain between modern psychology and Buddhism striking, but we meet also with the same misconceptions and objections. The denial of the existence of a soul-entity is supposed to be a denial of the soul and also of its immortality or its reincarnation.

PROFESSOR OLDENBERG'S VIEW.

Among the expounders of Buddhism Professor Oldenberg of Kiel ranks high. There are others that are his equal, but there is perhaps none who is his superior in scholarship. But with all his philological knowledge, the learned Professor is sadly deficient

in philosophical comprehension. He appears absolutely unable to grasp the significance of the Buddhistic soul-conception, and since his book on Buddha has become a great authority, in Germany almost the sole authority, from which our reading public take their opinions on Buddhism ready-made, his misconceptions have become instilled into the minds of European and American thinkers, and it will be worth while to point out the deficiencies of his propositions.

H. Dharmapâla, the secretary of the Mâha-Bôdhi Society and editor of the Mâha-Bhôdi Journal, the official delegate of Ceylonese Buddhism to the Chicago Parliament of Religions, wrote sorrowfully to me two years ago:

"Professor Oldenberg, the erudite scholar, has not grasped the spirit of the Dharma. He has translated carefully the Pâli words,—and that is all. A philologist may dissect the root of a Pâli word, but it does not make him know the spirit of Buddhism."

I have greatly profited by Professor Oldenberg's researches, which, considered as philological lucubrations, are very valuable, but I have, after all, felt constrained to adopt Mr. Dharmapâla's opinion. I have done so, however, not without hesitation, and not without having previously tried to reach a satisfactory explanation of his position. I shall here briefly call attention to his presentation of the Buddhist soul-conception and then point out the fallacies of his views. Professor Oldenberg says in the chapter entitled "The Soul":

"It is not incorrect to say that Buddhism denies the existence of soul, but this must not be understood in a sense which would in any way give this thought a materialistic stamp. It might be said with equal propriety that Buddhism denies the existence of the body. The body, and in the same sense the soul also, does not exist as distinct and self-sustaining substances, but only as a complex of manifold interconnected processes of origination and decease. Sensations, perceptions, and all those processes which make up the inner life, crowd upon one another in motley variety; in the centre of this changing plurality stands consciousness (viññâṇa), which, if the body be compared to a state, may be spoken of as the ruler of this state."[1] But consciousness is not essentially different from perceptions and sensa-

[1] "The following passage is often repeated in the sacred texts (e. g., in the 'Sâmaññaphala Sutta'): 'This is my body, the material, framed out of the four

tions, the comings and goings of which it at the same time superintends and regulates: it is also a Sankhâra, and like all other Sankhâras, it is changeable and without substance."

Professor Oldenberg adds:

"We must here divest ourselves wholly of all customary modes of thinking. We are accustomed to realise our inner life as a comprehensible factor, only when we are allowed to refer its changing ingredients, every individual feeling, every distinct act of the will, to one and the same identical ego, but this mode of thinking is fundamentally opposed to Buddhism. Here as everywhere it condemns that fixity which we are prone to give to the current of incidents that come and go by conceiving a substance, to or in which they might happen. A seeing, a hearing, a conceiving, above all a suffering, takes place: but an existence, which may be regarded as the seer, the hearer, the sufferer, is not recognised in Buddhist teaching." (*Buddha*. By Dr. Hermann Oldenberg. English Translation, p. 253.)

This is exactly the same as in modern psychology. The assumption of a soul-substance has been found to be a perfectly redundant hypothesis. The soul of man with all its various structures, or, as Buddhists would say, "samskâras," is now conceived as a product of evolution. Life develops the various sense-organs in response to the stimuli of the surrounding world. The function of seeing which is a reaction taking place in response to the impact of the ether-waves of light, results in the appearance of eyes, the function of hearing being a reaction in response to the impact of the air-waves of sound, produces the ear, and the interaction among the senses begets thoughts. The translator of Oldenberg's book, Mr. William Hoey, is not happy in his selection of words, for he says in the passage quoted:

"Sensations, perceptions, and all the processes which make up the inner life, crowd upon one another in motley variety."

Where Oldenberg speaks of *ineinanderströmen* (streaming one into the other), the expression "motley variety" is a redundant addition, and conveys the idea that Buddhistic philosophy regards

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elements, begotten by my father and mother . . . , but that is my consciousness, which clings firmly thereto, is joined to it. Like a precious stone, beautiful and valuable, octahedral, well polished, clear and pure, adorned with all perfection, to which a string is attached, blue or yellow, red or white, or a yellowish band."

the soul as a motley crowd of processes. Oldenberg perused the manuscript before it went to press, and it is probable that he took no offence at the expression; indeed the context appears to justify the translator. We would not hold Oldenberg responsible for mistranslations, but English readers know him through the translation only, and for their benefit we feel urged to add a few words in explanation.

Far from regarding the inter-relations of thoughts and sensations as a chance conglomeration, Nâgasena, the famous expositor of Buddhistic philosophy, makes the very opposite statement which in spite of its importance, is nowhere mentioned in Professor Oldenberg's work on Buddha.

We read in the *Milindapañha:*

"It is by a process of evolution that the soul-structures (sankhâras) come to be."

And this statement is inculcated again and again, not less than seven times—a strange anticipation of the evolution theory! And then we read that these soul-faculties that originate through evolution "are not combined indiscriminately" (I. 6, *Sacred Books of the East*, XXXV., p. 87). "First is sight and then thought," for "all that happens happens through natural slope" (p. 90) "because of habit" (pp. 89 and 91) and "on account of an association" (p. 89). In the same sense modern psychologists speak of the "path of least resistance," and the principle of association is so highly appreciated that the English school calls its doctrine the "psychology of association." There is certainly no justification for such a term as "motley variety" in characterising Buddhist psychology. On the contrary, we should be astonished at the anticipations of the most modern ideas.

Those who are accustomed to refer all psychic activity to one and the same identical ego, must, as Professor Oldenberg says, divest themselves of their customary modes of thinking; and he tries hard to do so himself, but he does not succeed.

The new psychology is, in fact, as much simpler than the old one as the Copernican system is simpler than the Ptolemaic sys-

tem, but in order to appreciate this truth we must be acquainted with the facts. The geocentric astronomy appears natural to him who believes that there is an upside and a down, not only on earth, but also in the heavens; and the egocentric psychology is that childlike soul-conception which knows nothing of evolution, but assumes that a stork or other messenger brings into the world at the moment of birth a soul, we do not know whence, which soul is made the lord of the new-born baby with all his inherited tendencies. A certain amount of knowledge is necessary to comprehend the new views in both sciences, but he who has outgrown his mental swaddling clothes will not fail to abandon both the geocentric view in astronomy and the egocentric view in psychology.

VACCHAGOTTA'S QUESTION.

Professor Oldenberg believes that not only the negation of the ego but also the negation of an eternal future must be regarded as the correct solution of the Buddhistic dialectic, and he claims that this was not openly pronounced by the Buddha because he feared to shock the hearts that quailed before the nothing. And yet Oldenberg quotes at the same time the passage of the *Samyuttaka Nikâya* in which the doctrine of annihilation is squarely denounced as a heresy. We read:

"'At this time a monk named Yamaka had adopted the following heretical notion: "I understand the doctrine taught by the Exalted One to be this, that a monk who is free from sin, when his body dissolves, is subject to annihilation, that he passes away, that he does not exist beyond death."'" (Oldenberg, *Buddha*, Engl. ed., p. 281.)

When Sâriputta convinces Yamaka that he does not even in this world appreciate the Perfect One, the monk confesses his error and he says:

"'Such, indeed, was hitherto, friend Sâriputta, the heretical view which I ignorantly entertained. But now when I hear the venerable Sâriputta expound the doctrine, the heretical view has lost its hold of me, and I have learned the doctrine.'" (*Ib.*, p. 282.)

In spite of innumerable passages which prove that Nirvâna is not annihilation, Oldenberg declares that "the doctrine that there

is no ego is equivalent to the proposition: The Nirvâna is annihilation." Professor Oldenberg adds:

"But we can well understand why these thinkers, who were in a position to realise this ultimate consequence and to bear it, abandoned the erection of it as an official dogma of the Buddhist order. There were enough, and more than enough of hopes and wishes, from which he who desired to follow the Sakya's son, had to sever his heart. Why present to the weak the keen edge of the truth: the victor's prize of the delivered is the Nothing? True, it is not permissible to put falsehood in the place of truth, but it is allowable to draw a well-meant veil over the picture of the truth, the sight of which threatens the destruction of the unprepared. What harm did it do? That which was alone of intrinsic worth and essential to excite the struggle for deliverance was maintained in unimpaired force, the certainty that deliverance is to be found only where joys and sorrows of this world have ceased. Was the emancipation of him, who knew how to free himself from everything transitory, not perfect enough? Would it become more perfect if he were driven to acknowledge that beside the transitory there is only the Nothing?" (*Ib.*, 273, 274.)

Buddha, it is true, limited himself to that which conduces to deliverance, holiness, peace, and enlightenment, and gave no answer to questioners who were not prepared to understand his doctrine. Thus Oldenberg quotes the following passage from the *Samyuttaka Nikâya:*

"'Then the wandering monk[1] Vacchagotta went to where the Exalted One was staying. When he had come near him he saluted him. When, saluting him, he had interchanged friendly words with him, he sat down beside him. Sitting beside him the wandering monk Vacchagotta spake to the Exalted One, saying: "How does the matter stand, venerable Gotama, is there the ego (attâ)?"'

"When he said this, the Exalted One was silent.

"'How, then, venerable Gotama, is there not the ego?'

"And still the Exalted One maintained silence. Then the wandering monk Vacchagotta rose from his seat and went away.

"But the venerable Ânanda, when the wandering monk Vacchagotta had gone to a distance, soon said to the Exalted One: 'Wherefore, sire, has the Exalted One not given an answer to the questions put by the wandering monk Vacchagotta?'

"'If I, Ânanda, when the wandering monk Vacchagotta asked me: "Is there the ego?" had answered: "The ego is," then that, Ânanda, would have confirmed the doctrine of the Samanas and Brahmanas who believe in permanence. If I

"[1] A monk of a non-Buddhistic sect. The dialogue here translated is to be found in the *Samyuttaka Nikâya*, Vol. II., fol. tan.

Ânanda, when the wandering monk Vacchagotta asked me: "Is there not the ego?" had answered: "The ego is not," then that, Ânanda, would have confirmed the doctrine of the Samanas and Brahmanas, who believe in annihilation. If I, Ânanda, when the wandering monk Vacchagotta asked me: "Is there the ego?" had answered: "The ego is," would that have served my end, Ânanda, by producing in him the knowledge: all existences (dhamma) are non-ego?'

"'That it would not, sire.'

"'But if I, Ânanda, when the wandering monk Vacchagotta asked me: "Is there not the ego?" had answered: "The ego is not," then that, Ânanda, would only have caused the wandering monk Vacchagotta to be thrown from one bewilderment into another: "My ego, did it not exist before? but now it exists no longer."'"

Oldenberg's interpretation of this passage is as follows:

"We see: the person who has framed this dialogue has in his thought very nearly approached the consequence which leads to the negation of the ego. It may almost be said that, though probably he did not wish to express this consequence with overt consciousness, yet he has in fact expressed it. If Buddha avoids the negation of the existence of the ego, he does so in order not to shock a weak-minded hearer." (*Ib.*, 272, 273.)

Any one who understands the doctrine of modern psychology will appreciate Buddha's silence, which is amply explained by Buddha's words. Buddha refuses to answer the questions of Vacchagotta, but he gives a satisfactory explanation to Ânanda.

It appears that Vacchagotta was a man who exhibited a hopeless confusion concerning the fundamental notions of the Buddhist psychology. Buddha, it is true, denied the existence of an ego-soul; he denied that that something in man which says "I" can be regarded as a metaphysical soul-principle lording it over all the faculties of man; but Buddha does not deny the reality of man's actual soul, his sensations and motor ideas; he does not deny the presence of consciousness, nor that there is a psychic structure in him that says "I." On the other hand, he does not teach that the soul of man (his sankhâras) will be annihilated in death. He teaches reincarnation, man's soul-structures will reappear, or rather they continue to exist after death. They are impressed upon others, and there is no annihilation; they are preserved exactly in the way in which they manifested themselves. Thus Vacchagotta's question

could not be answered with a straightforward Yes or No. A simple Yes or No would under all conditions simply have increased the questioner's confusion. The question could be answered only after a discussion and complete explanation of the meaning of the term ego, which for reasons not mentioned in the dialogue the Buddha did not see fit to make. Probably he deemed it a waste of time to have a controversy with a professional controversialist and therefore refused to accept his challenge.

Suppose a carpenter's apprentice without education who understood nothing of mathematics, had approached the late Professor Gauss of Göttingen and asked him: "I understand that the Professor denies the reality of circles and lines, that he declares they are purely mental, ideal products of imagination, and quite unsubstantial? Will not the learned Professor answer my question squarely and in a straightforward manner, without reserve and without shirking the issue, Is mathematics substantial or is it not substantial?" What would Professor Gauss have said? Had he said, "mathematical figures are substantial," the apprentice would have acquired an erroneous notion regarding the nature of mathematics; but had the Professor said "Mathematics are unsubstantial and purely ideal," the young fellow would have thought that mathematical constructions were arbitrary and imaginary like dreams. Professor Gauss would probably not have answered the question at all, for whatever he might have said, it would have been bewildering to the questioner. Now, should we say, on reading the report of such an interview, that Professor Gauss had practically taught the non-existence of mathematics? And could we presume that we understood why he avoided to draw the last conclusion of his doctrine; namely, for the reason that he did not want to shock the weak-minded hearer who still clung to the idea that there is a substance of mathematics?

Professor Oldenberg's interpretation of the passage quoted from the *Samyuttaka Nikâya* would make of the Buddha a hypocrite or a coward, for it represents him as not willing to concede the last consequence of his doctrine and without directly telling a lie as trying to make a false impression upon his interviewer. If Vac-

chagotta had been one of Buddha's followers, there might have been a reason for Buddha's not shocking his religious faith, but Vacchagotta belonged to a non-Buddhistic sect, and his question was not made in anxiety or with quivering lips. The context of the passage refutes Professor Oldenberg's interpretation.

Why not understand the passage as it reads? Had the Buddha said "the ego is not," Vacchagotta would imagine that the Buddha believed in annihilation, a doctrine which is unequivocally condemned in the Buddhist canon as a heresy. According to Professor Oldenberg, however, this would be the true import of the Buddhist religion. Vacchagotta, relying on the fact that his ego-consciousness was real, would say: "Did not my ego exist before? and now I am told that there is no ego." In the same way the hypothetical carpenter's apprentice in his interview with Professor Gauss would have said: "The lines which I use in measuring beams and boards are real; and yet this man who is supposed to be a great authority in mathematics tells me that mathematical lines are purely ideal!" We cannot help thinking that if Professor Oldenberg had asked the Buddha whether or not he taught the immortality of the ego, the Buddha would have given him the same answer as he did Vacchagotta: he would have remained silent.

Professor Oldenberg takes a denial of the existence of the ego-soul as a denial of the existence of the soul itself, in the same way that the carpenter's apprentice might have understood that Professor Gauss, not believing in a mathematical substance, denied the existence of mathematics altogether. Truly, to understand Buddhism, we must have an inkling of the fundamental notions of philosophy, and with all due respect for Professor Oldenberg's philological erudition, we cannot help saying that philosophical comprehension is a weakness of his which renders him unable to grasp the meaning of Buddhism.

The soul, according to Buddhism, does not consist of substance but consists of sankhâras, which are sentient structures or forms produced by deeds, by karma, or function. A man's personality is name and form. The name may be preserved and the form may

reappear in new generations. The individual dies, but its form continues by rebirth. There is no individuality in the sense of the Brahmanical âtman theory, but the individuality of a man, his name and form are for that reason real enough; and name and form are either singly, or sometimes together, preserved and reindividualised. There is a continuity in life in which the same form is preserved, and this continuous preservation of form is all that is and can be meant by sameness of personality. This is the secret (if there be any secret about it) of the Buddhist psychology.

IS NIRVÂNA ANNIHILATION?

Professor Oldenberg's conception of Buddhism differs from mine; he says in a letter to me:

"Buddhism, in my opinion, suffers from the contradiction, historically quite conceivable, that on the one hand, it retains the old, concrete, and popular conception of a transmigration of the soul, on the other hand dissolves in its philosophy the idea of a soul as a substratum, an ego-being. This is a contradiction which will never be overcome by your attempt at sublimating the category of karma. Had Buddha not believed in a transmigration of the soul, suicide should have appeared to him as the quickest and best adapted means of making an end of suffering. A few drops of prussic acid would be a better, and at any rate a more rapid remedy than the holy eightfold path."

If this opinion of the learned Pâli Professor be tenable, the Buddha, who is generally regarded as one of the keenest thinkers that ever lived on earth, would have both denied the existence of a thing and at the same time have taught that it migrated from place to place. And we are requested to believe that the Buddha should have been guilty of such a gross contradiction! No, I would rather run the risk of doubting the infallibility of a German professor!

While Professor Oldenberg's summary solution is *prima facie* improbable, it is at the same time based upon incorrectly-stated facts. Buddhism teaches reincarnation, but it does not teach the migration of the soul. Professor Oldenberg's book, although good in many respects, is very deficient in its exposition of the Buddhist psychology, which is just the most important part of Buddhism.

Oldenberg must have overlooked the passages in which the theory of soul-migration, in the sense of an ego-soul migrating from one body into another, is rejected. Buddhism denies that the soul is a substance, and in spite of Professor Oldenberg's statement to the contrary, it denies also most emphatically and unequivocally that there can be any transmigration or transportation of soul-substance. Yet Buddhism asserts the reappearance of the same soul-forms. We read in the *Questions of King Milinda*, III., 5, (*Sacred Books of the East*, XXXV., p. 111):

"Where there is no transmigration, Nâgasena, can there be rebirth?"

"Yes, there can."

"But how can that be? Give me an illustration."

"Suppose a man, O king, were to light a lamp from another lamp, can it be said that the one transmigrates from, or to, the other?"

"Certainly not."

"Just so, great king, is rebirth without transmigration."

"Give me a further illustration."

"Do you recollect, great king, having learnt, when you were a boy, some verse or other from your teacher?"

"Yes, I recollect that."

"Well, then, did that verse transmigrate from your teacher?"

"Certainly not."

"Just so, great king, is rebirth without transmigration."

"Very good, Nâgasena!"

In the Jataka tales and other popular legends expressions are frequently retained which suggest the old Brahmanical conception of a transmigration of soul, but philosophical expositions of the problem leave no doubt about the meaning of the Buddhistic idea of rebirth. At any rate, here is a plain statement in one of the most famous and authoritative Buddhist scriptures, which denies that there is any transmigration of a soul-entity; and thus Professor Oldenberg's charge of inconsistency falls to the ground, as it rests on a misstatement of the Buddhist faith.

Here is another example, adduced by Nâgasena in the *Milinda-pañha:*

The mango that is planted rots away in the ground, but it is reborn in the mangoes of the tree that grows from its seed. He

who steals the fruit steals the property of him who sowed the mango. There is no transmigration of a mango-soul from the seed to the fruit, but there is a reconstruction of its form. Thus (as said he who came from Nazareth) the body of a man can be broken down like a temple that is destroyed, but it can and will be built up again. The life of a man does not end with death, for his soul is reincarnated again and again.

And how does this transfer of soul take place? Partly by heredity as is explained by Nâgasena in the illustration of the mango seed, partly by communication. A particular man is not a discrete individual, but a trysting-place of soul-activities, of sankhâras, which are impressed into him by example and education. Thus, a boy in school learns a verse by heart; there is no transfer of soul-substance migrating from the teacher to the pupil, but there is a reincarnation of a certain soul-form. The teacher's words are impressed into the boy; and this is called by Nâgasena "rebirth without transmigration."

Similar passages and similes in explanation of the same idea are found in the *Visudhi-Magga*, where the transfer of soul is illustrated by the reappearance of the form of a face in the mirror, of a voice in its echo, of a seal in its imprint, etc.

Professor Oldenberg knows very well that Nirvâna in the Buddhist texts is not annihilation, but deliverance from evil; and there are innumerable passages which characterise it as the state of highest bliss. Professor Oldenberg quotes several passages from various sources, which corroborate the positive conception of Nirvâna, He says:

"Buddhist proverbs attribute in innumerable passages the possession of Nirvâna to the saint, who still treads the earth:

"'The disciple who has put off lust and desire, rich in wisdom, has here on earth attained the deliverance from death, the rest, the Nirvâna, the eternal state.' Suttasangaha, fol. cû., a Brahmanical ascetic addresses to Sâriputta this question: 'Nirvâna, Nirvâna, so they say, friend Sâriputta. But what is the Nirvâna, friend?' 'The subjugation of desire, the subjugation of hatred, the subjugation of perplexity; this, O friend, is called Nirvâna.'" (*L. c.*, p. 264.)

But Nirvâna may be the *summum bonum*, because it involves the

cutting off of the cause of existence, and the state of Nirvâna may become an actual annihilation at the moment of death. Yet even the final goal of saintship is not characterised as an absolute extinction. Professor Oldenberg quotes the following passages from the *Udâna* (fol. ghau):

"'There is, O disciples, a state, where there is neither earth nor water, neither light nor air, neither infinity of space, nor infinity of reason, nor absolute void, nor the co-extinction of perception and non-perception, neither this world nor that world, both sun and moon. That, O disciples, I term neither coming nor going nor standing, neither death nor birth. It is without basis, without procession, without cessation: that is the end of sorrow.

"'There is, O disciples, an unborn, unoriginated, uncreated, unformed. Were there not, O disciples, this unborn, unoriginated, uncreated, unformed, there would be no possible exit from the world of the born, originated, created, formed.'"

Professor Oldenberg adds the following comments:

"These words seem to sound as if we heard Brahmanical philosophers talking of the Brahma, the unborn, intransient which is neither great nor small, the name of which is 'No, No,' for no word can exhaust its being. Yet these expressions, when viewed in the connexion of Buddhist thought, convey something wholly different. To the Brahman the uncreated is so veritable a reality, that the reality of the created pales before it; the created derives its being and life solely from the uncreated. For the Buddhist the words 'there is an uncreated' merely signify that the created can free himself from the curse of being created (in the 'Dhammapada' it is said, v. 383): 'If thou hast learned the destruction of the sankhâra, thou knowest the uncreated'—there is a path from the world of the created out into dark endlessness. Does the path lead into a new existence? Does it lead into the Nothing? The Buddhist creed rests in delicate equipoise between the two. The longing of the heart that craves the eternal has not nothing, and yet the thought has not a something, which it might firmly grasp. Farther off the idea of the endless, the eternal could not withdraw itself from belief than it has done here, where, like a gentle flutter on the point of merging in the Nothing, it threatens to evade the gaze." (*Ib.*, p. 283, 284.)

Is there no other interpretation of the quoted passages than the one offered by Professor Oldenberg, viz., that the Buddhist faith is equivocal, and that it leaves the question undecided, either as an "unfathomable mystery," or as "resting in a delicate equipoise between the idea of a new existence and nothing"?

It would be difficult here for any man to speak authoritatively,

but it appears to me the solution is not far to seek. The attainment of Nirvâna consists in enlightenment, that is to say, in a recognition of the fundamental truths of religion, which in their practical application are expressed in the noble eightfold path of righteousness. All individual craving has disappeared in the saint; he has become an incarnation of truth, not of theoretical or purely scientific notions concerning the nature of things, but of practical truth which manifests itself in a moral life. Thus Nirvâna is actually an utter annihilation of the thought of self and an embodiment of universal love and righteousness. Those eternal conditions which constitute righteousness are realised in a human heart.

If we translate Buddhist thought into Christian terms, we would say that the attainment of Nirvâna means God-incarnation, and the Buddha is the God-man. Shall we say that the eternal conditions of righteousness are a mere nothing, because they are unsubstantial? Are they non-existent because they are not concrete things, not material objects? That would certainly lead to a serious misconception of the most important facts of existence!

Further, must God be considered as a non-entity when we learn to understand that God is not an individual being? Dwindles the Christian idea of Heaven away, because astronomy finds no place for it in the stars? There are things spiritual the existence of which does not depend upon a definite locality. The Pythagorean theorem is true, and would remain true, even if the world existed no longer. It is an eternal verity and not a mere nothing. This is illustrated in the "Questions of King Milinda" as follows:

> "The king said: 'Venerable Nâgasena, where does wisdom dwell?'
>
> "'Nowhere, O king.'
>
> "'Then, sir, there is no such thing as wisdom.'
>
> "'Where does the wind dwell, O king?'
>
> "'Not anywhere, sir.'
>
> "'So there is no such thing as wind.'
>
> "'Well answered, Nâgasena.'"

It may be difficult to the untrained to understand the paramount importance of eternal verities, but no one can deny their actual presence in life. What other meaning can there be in the

words of Christ when he says: "Heaven and earth may pass away, but my words shall not pass away." The Buddha utters the same sentiment. He says:

"The Buddhas are beings whose word cannot fail; there is no deviation from truth in their speech," etc. (*Buddhist Birth Stories*, p. 18.)

The words of Buddha are not merely the sankhâras of his individual existence, but the eternal verities which shall not pass away, and he who realises them in his soul has attained Nirvâna.

Now, I can see Professor Oldenberg smile, and hear him say, "That is what I mean; Nirvâna is, according to Buddha, the attainment of the eternal verities, and nothing else; accordingly it is tantamount to extinction. Nirvâna is not a place, and the Buddha after his death is no longer a definite individuality that can be pointed out to be here or there. *Ergo* he is dissolved into nothing." To be identical with verities that are eternal but have no dwelling place in space is, in the opinion of many, an annihilation; for ubiquity and nullibility are to their minds two expressions of one and the same thing. Kepler's soul has become the recognition of the three famous laws that bear his name; Ludolf is identified with the calculation of π; Newton with the formulation of the law of gravitation. They attained, each one in his own way, some special aspect of the uncreated, the eternal, the unborn. In the same way the Buddha (in the Buddhistic conception) has become the moral law which is, ever was, and shall remain forever the path of delivery from evil. Immortality is claimed for the Keplers, the Ludolfs, and Newtons, not for their names alone, because their names might be forgotten, but for their souls, for their ideas, for the verities with which they have become identical; and in the same sense, only in the broader field of religious truth, Buddhists believe in the eternal omnipresence of the Buddha. If that be nothing, then "Nothing" stands for the highest and noblest that can be thought of, and Nothing would be the divinest thing in the universe. Indeed, those invisible realities which, when recognised, are called truths, are of greater importance than concrete things and individual beings.

This is plain to every one who understands that truths are real, even though they are not substances or entities. And the same is true of the soul. To deny that volition, cognition and other mental activities are substances, or entities, or that they need a substratum or metaphysical subject in order to be real, is not a denial of their existence—it is simply the consistent consequence of the commonly acknowledged truth that they are not material.

Here lies the main difficulty in understanding Buddhism, which, whether we praise it or condemn it, must be recognised as the most philosophical of all religions. There is no use in understanding the words of the Buddhist texts, if we have no comprehension of their meaning. And how gross Professor Oldenberg's conception is, appears from his proposition that unless Buddha had been guilty of the inconsistency of believing in soul-transmigration, suicide would have been a better remedy for the evils of existence than the noble eightfold path of righteousness.

Suicide causes the dissolution of the individual; it sets an example which in the hearts of others will, according to circumstance, bear evil fruit; it causes consternation and unrest, and can therefore not lead to the cessation of suffering; under no condition could it conduce to the attainment of Nirvâna. He who imagines that but for the supposition of a transmigration of soul, suicide would be a more appropriate and safer method of reaching Nirvâna than the eightfold path of righteousness, has no inkling of the significance of Nirvâna.

Whatever error I may be guilty of in my own representations of Buddhism, be it in essays that I have written or in the *Gospel of Buddha*, this much is sure, that Professor Oldenberg has misunderstood its most salient doctrines, those on the nature of the soul and of Nirvâna. Being a professor who has studied the southern canon of Buddhism in its original documents, he is by many people looked upon as the greatest living authority on the subject, and he can therefore not fail to propagate his misconceptions. Misconceptions in all fields of thought are unavoidable, but if they originate in men who are called upon to be the channels of our information the result will be sad.

Professor Oldenberg is a good scholar, and, I repeat, I gladly acknowledge my indebtedness to him as a philologist; he may also be a good historian, but he has shown himself to be incompetent as an interpreter of Buddhism. His expositions remind us of the parable of the hardwood,[1] that is related in the *Majjhima-nikâyo*, where we read:

"It is exactly, O monks, as if a man who demands hardwood, seeks for hardwood, and looks out for hardwood, climbs over the hardwood of a big hardwood tree, over the greenwood, over the bark, to the boughs and cuts off a twig, taking it along with the idea 'that is hardwood.' Suppose that a clear-sighted man observes him, saying: 'This good man really knows neither hardwood, nor greenwood, nor bark, nor boughs, nor foliage, therefore this good man who demands hardwood, seeks for hardwood, looks out for hardwood, climbs straightway over the hardwood of a large hardwood tree, over the greenwood, over the bark, and cuts off a twig in the opinion that it is hardwood. But the hardwood which he will get from the hardwood of the twig will not serve his purpose.'"

Professor Oldenberg has devoted his life to the decipherment of Sanskrit and Pâli, but he has failed to comprehend the significance of Buddhism. He has climbed over the hardwood of the doctrine of the Buddha without comprehending either its import or possible usefulness, and, presenting us with the foliage of externalities, assures us that this is the hardwood of Buddhism.

CONCLUSION.

Buddhism is decidedly not nihilism, and Nirvâna does not mean annihilation. Buddhism in its purest form is, more than any other religion, stated in philosophical terms, which, the more positively philosophical they are, will naturally appear to unphilosophical minds as mere negations.

Christians find it difficult to comprehend Buddhism, but the fact remains that what Christianity has been to Western peoples, Buddhism was to the nations of the East; and all the dissimilarities will in the end only serve to render the similarities that obtain between them the more remarkable.

While we are not blind to the great preferences of Christianity,

[1] See Karl Eugen Neumann, *Die Reden Gotamo Buddho's*, p. 304–325.

we must grant that Buddhism is a truly cosmopolitan religion. Buddhism can comprehend other religions and interpret their mythologies, but no mythology is wide enough to comprehend Buddhism. Buddhism is, as it were, religious mythology explained in scientific terms; it is the esoteric secret of all exoteric doctrines. It is the skeleton key which in its abstract simplicity fits all locks.

This is the reason why Buddhism can adapt itself to almost any condition and can satisfy the spiritual needs of great and small, high and low, of the learned as well as the uncultured. It offers food for thought to the philosopher, comfort to the afflicted, and affords a stay to those that struggle. It is a guide through the temptations of life and a lesson to those in danger of straying from the right path. And yet it demands no belief in the impossible; it dispenses with miracles, it assumes no authority except the illumination of a right comprehension of the facts of existence.

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IT IS unnecessary to repeat the criticism which I have already given of the latest remarkable work of M. TH. RIBOT, *La Psychologie des Sentiments.* I desire merely to call attention to the approved merits of his method, to his steadfastness in adhering to one point of view and in supporting his conclusions upon a few dominating ideas, whose ramifications he unerringly follows, and finally to the decision which he evinces in his criticism of the numerous theories that come in his path, and between which he is obliged to choose.

To abide as rigidly as possible by the naked statement of facts, to strive constantly to single out the simple and primitive from the complex and secondary, such is the maxim followed by M. Ribot. Evolution supplies him with his instrument of analysis — the sound principle that all the luxuriant embroidery of higher life has been raised upon the canvas background of fundamental tendencies. And as these tendencies, which are the very basis of our being, are manifested in movement, the motor element can serve us in the construction of a theory of the great psychological facts.

Conformably to this conception M. Ribot does not hesitate to declare that the motor manifestations are the essential thing in the sphere of sentiment, that "what are called agreeable or painful states constitute but the superficial portion of affective life, the lowermost element of which reposes on tendencies, appetites, needs, desires, which are translated by movements." The doctrine thus clearly formulated serves him as a guiding thread in all his studies,

whether he is dealing with subjects of general psychology (pleasure and pain, emotion and affective memory) or whether he is engaged with subjects of special psychology, such as the instinct of preservation, sympathy, the sexual instinct, social and moral instincts or religious, æsthetical, and intellectual sentiments.

M. Ribot has given us a motor theory of *attention*. He will give us later perhaps a motor theory of *imagination*. We hope it will be permitted him to explore in this manner the whole domain of psychology. In any event, he will have left upon this department of inquiry a strong impress, will have cleared up many obscure problems, and generally advanced solutions even where it has not been his lot to discover them definitively.

* * *

But yesterday the miracle of the world was *life*, to-day it is *consciousness*. The physiologists, and with them Claude Bernard, had regarded life as an irreducible property; afterwards it was sought to reduce it to terms of physics and chemistry, and one is inclined to think that the problem has been approximately solved after having read the extremely valuable work of M. F. Le Dantec, *Théorie nouvelle de la vie*. M. Le Dantec progressively studies the life of monoplastidules, or elementary life, then that of polyplastidules, or life properly so called, and concludes with a few pages upon psychic life. I cannot enter into the details of this work. It will be sufficient to emphasise the clear and new views of the author on life and death, and to mention the two principal conclusions of his book: (1) that psychic life is an epiphenomenon of physiological life, all things going forward physiologically as if consciousness did not exist at all; and (2) that in everything affecting the senses of observing living beings there is nothing transcending the natural laws established for gross matter, that is to say, the laws of physics and chemistry. M. Le Dantec is free from all dogmatism. His work will no doubt be widely noticed by biologists and philosophers.

I should make good an omission which I have made of an interesting volume by M. A. Sabatier, *Essai sur l'immortalité au point*

de vue du naturalisme évolutioniste.[1] The difficulty of the spiritualist conceptions regarding the survival of the ego has, as we know, always been the "realising," or the infusing of palpable life into, the soul, which at the same time it is sought to make immaterial and virtual, and to keep one and indivisible. M. Sabatier has sought to transcend this obstacle by imagining an ultra-terrestrial plasma as the physical vehicle of immortality. This plasma would be at once matter and space, life and spirit; the nervous centres would play with respect to it the rôle of accumulators, or condensers, creating conscious personality, and this personality once created could be affixed after death to a new organism capable of maintaining its integrity and even of increasing its energy.

The hypothesis of an ultra-terrestrial plasma is interesting, but it is not easy to conceive what would become of the diffuse psychical states which are imagined apart from all conscious subjects, nor how consciousness, if it depends on the association of nervous elements, could survive their dissociation.

There has also been much talk of two works by M. A. De Rochas, *L'extériorisation de la sensibilité* and *L'extériorisation de la motricité.*[2] The experiments which are mentioned in these works should not be confounded with the "miracles" performed in the séances of the spiritists. M. de Rochas is a man of worth and an inquirer of sincerity. Nevertheless, he does not take sufficient precautions against suggestion and fraud. I have recently learned from well-informed persons, that his celebrated subject, his medium, had—after imbibing—revealed some of his methods. M. de Rochas himself has exposed some of these impositions, but it does not appear that he has discovered them all. His facts have not been sufficiently corroborated to permit his hazarding the rearing of a structure thereon. Does this mean that one must deny without hearing, and that no properties of nervous energy remain to be discovered? Not at all. We have simply to leave certain questions open, so as not to adopt precipitate and false solutions.

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[1] Fishbacher, publisher.

[2] Chamuel, publisher. The remaining works are published by Felix Alcan.

A communication addressed to the Munich Congress by DR. BARADUC marks the beginning of a new order of researches, simultaneously pursued in Paris by a young scientist, M. RADEL, concerning whose work our journals published last August some brief mention. M. Baraduc flatters himself that he has photographed thought, and M. Radel that he has photographed dreams. That is to say, photography is said to have revealed to them the fact that there exist modes of exchanging nervous energy with the external environment, and also particular forms of the discharge of that energy. We are in the way here, should these doubtful facts be true, of not only giving precise material and form to intelligence, but of more proximately grasping the physiological fact corresponding to the psychological operation.

* * *

M. DE ROBERTY gives us the first volume of his *Ethique, Le Bien et le Mal,*—an interesting work, as are all those of this author, both by its contents and its signification in the philosophical whole to which it belongs. It is less a systematically constructed book than a series of controversial articles, in which the enthusiasm of the writer breathes of the spirit of life, yet not without the sacrifice of lucidity. M. de Roberty predicates with many others the relativity of morals and pronounces future "immorality" as a benefaction. The term immorality signifies here, so far as I can understand, nothing but the end of special systems of morals, which are an obstacle to evolution, and not the end of all norms and of all authority. To every social organisation there corresponds, of necessity, an organisation of ideas and emotions which is morality itself. And it is thus that ethics is modified, but not without the establishment in the course of evolution of principles which thenceforth become, as I have elsewhere shown, the axis about which a new society grows up.

But we touch here the kernel of M. Roberty's book. He has proposed to answer mainly two questions: first, what is the place of morals with respect to biology, with respect to psychology, and with respect to sociology. Secondly, of the moral fact and social fact, which is prior?

To biology, he concludes, rudimentary psychism belongs; to sociology collective psychism, the study of which will take up the second volume of his *Ethique*. The florescence of life—religion, philosophy, science, and art—is not entirely due to the normal evolution of biological psychism; it results from the fusion of purely vital energies and of social forces derived from the biological order. Psychology, accordingly, would not be an abstract science (a science of *being*), taking rank after cerebral physiology; but it would be a concrete discipline (a science of *becoming*), a body of knowledge derived from the two conjoint sciences of biology and sociology.

As to the moral facts and the social facts it is to be said that the first engender the second rather than that they are derived from them. The social facts are the form in which the moral facts are clothed; in reality we have here the same order of phenomena, subject to a continuous evolution, in which, however, we must distinguish two aspects, the moral, which is within, and the social, which is without. I find nothing to object to in this conception. It has seemed to me clear for a long time that the same needs have given rise to society simultaneously with morality; that the development of both has proceeded upon the basis of our fundamental organic tendencies; and finally, that sociology is always broader than historical systems of morality, so that the latter constantly tend to conform to the former, and the psychological states of social individuals, that is to say, ends or duties, to agree more and more exactly with one another, instead of becoming antagonistic.

* * *

M. Louis Couturat, who gives us a book on *L'Infini mathématique*, is certainly a scholarly and distinguished author, yet one of a class in whom philosophical studies have strangely warped the geometrical spirit. His object has been to prove, as before him others have sought to do, that we can think and comprehend the infinite although it is not representable. He has sought this proof by a criticism of the data of mathematical analysis. But he commits in my judgment two fundamental errors. The first is the mistaking of the true nature of arithmetic. Arithmetic is a mere instrument of precision, the perfecting of which, as determined by

its application to complex questions and as pushed higher and higher by necessity, are recorded in history by the successive consideration of irrational numbers, imaginary numbers, limits, etc. It is not permissible to ascribe to the artifices which support it a mysterious value, or to attempt to objectify and hypostatise the purely logical conceptions which analysis has introduced into thought.

The second error is the attributing a special efficacy to magnitude, such that analysis is made to repose upon the idea of *magnitude* and not upon the idea of *number*. As if magnitude signified anything, so long as it remains undetermined, that is, unexpressed by means of numbers, which are the precise elements of its determination!

Cannot M. Couturat see that his induction ultimately leads to quite arbitrary changes in the true signification of words, and that the infinite which he has in mind and seeks to demonstrate is not at all the mathematical infinite?

* * *

I hasten on to the new publication of M. J. STRADA, *Jésus et l'ère de la science, la véritable histoire de Jésus*, and I take this occasion of calling the attention of my readers to the author himself, who is a philosopher by nature. M. Strada has had the singular fortune of passing his life almost entirely neglected by the official philosophical public, although he has published more than twenty books on philosophy, social science, and history, not to mention an enormous poetical work, *L'Epopée humaine*, which already embraces nineteen volumes. He undoubtedly owes the neglect which he has brought upon himself—if it can be called such—to the strange forms of his language and to the intricate style of his dialectics. I say that he has been neglected; I do not say that he has been overlooked or ignored. He has himself claimed priority for the theory of *idées-forces*, which M. Fouillée developed with such talent and originality.

Twenty years ago I read the *Ultimum Organum* of M. Strada, which had appeared ten years previously. I was struck with the work and spoke of it in my first modest and imperfect maiden effort.

Quite recently I reviewed in the *Revue Philosophique* another work by the same author, *La loi de l'histoire*, and I could not help remarking the agreement of Strada's law with that of Comte. M. Strada explains history, as did Comte, by intelligence; and the sequence of the methods of mind established by him—fideism, with faith as its criterion, rationalism with evidence, and impersonalism with facts—recalls the three ages, the theological, metaphysical, and positive, of his predecessor. M. Strada has made a novel and felicitous point where he reproaches positivism and modern science with having accepted experiment as a criterion, a thing which is for him merely a methodological instrument. The proper criterion, he contends, is found neither in experiment, in the syllogism, nor in mathematics, which are a simple means of reaching facts; it is found in the *Fact* alone. It is the *Necessary Fact* which is the criterion, not fluctuating and changing man, and hence the name of methodological impersonalism, or of the impersonal method, which he has given to his doctrine.

Yet the fact, one will say, is the very thing that experiment seeks to disclose. And the confusion is not as great as M. Strada imagines. It is true that in declaring experiment to be the criterion, we are in danger of excluding all metaphysics from knowledge, and the syllogism alone, according to M. Strada, reaches the metaphysical fact which he wishes to restore. There is a broad field for discussion regarding the scope ascribed by him to the syllogism and regarding his handling of the antinomies which leads him to affirm God to be the Pre-antinomic. But this discussion would be at present beyond our scope, and I return to the *Jésus* which I mentioned above. The work is large and interesting. Many people will be offended by it, and yet the restoration of the true history of Jesus which M. Strada attempts, taking his stand solely on the text of the Gospels, directly and respectfully consulted, appears to me an extremely probable one. Nothing is more striking than the sureness and frankness with which the author substitutes what he calls the fact-mediator for the deified mediators, such as Buddha, Jesus, and Mohammed, that is to say, a religion of science for fideisms of all sorts. M. Strada will finish this work in a new

volume, "The Religion of Science," which will certainly rank among the most interesting. An eloquent and convinced writer, with a zeal amounting almost to passion, he not only impresses and moves his public but also forces them to think. He knows philosophy as it is not known now-a-days, and handles language with an energy far above the ordinary. Although I do not give my full adhesion to his doctrine, I am ready to render him this homage and to bring his work to the attention of readers who doubtless are unaware of his existence.

LUCIEN ARRÉAT.

PARIS.

CRITICISMS AND DISCUSSIONS.

PANLOGISM.

A reply to Dr. Carus's reply (October number of *The Monist*) would involve a very lengthy paper. The issues raised open up a controversy of very extensive scope: in fact practically all the questions differently answered by the "monistic positivism" of my kindly and accomplished critic and by my own Neo-Leibnitzian monadism. And in view of the space occupied by me in the last *Monist*, I lack the effrontery to pen the long essay required.

Let me say here that all the issues are treated—some at considerable length—in my *Riddle of the Universe* (Arnold: London and New York). Those, however, who desire a succinct statement of the *ground-principles* of my system, may be referred to the essay in the July number of the *Free Review* (London: Swan, Sonnenschein) entitled "The New Monadism." Pending the publication of my developed system, I have nothing to add to the arguments there advanced. Let me observe in passing that no one who reads this essay will echo Dr. Carus's opinion that my monads are "substances which, for the sake of ridding them of gross materiality, have been reduced to atomic size." Size is a space-attribute, and space, in my view, only a form of perception *and ideation* of a monad. The monad or self (Kant's "transcendental subject") is not in space, but contrariwise space is in it. I have dealt in the *Riddle* with this issue at length and cannot understand how one who reads it can fail to follow my meaning.

I must just glance in passing at Dr. Carus's theory of Immortality. Jesus is immortal because his words are immortal. "The words of Jesus are his soul." "Christ lives where the word of Christ is received and where it becomes the motive of conduct." This is a *Comtean* immortality only. Jesus or John Smith is not destined to enjoy or suffer a perpetuity of *conscious* life: they only pass on ideas or "thought-forms." Let me point out some considerations bearing on this doctrine:

1. The immortality is verbal. Indeed, it is not even this. The slow freezing of the planet, nay, even the perishing of certain human stocks, would terminate it! Jesus would no longer persist, were there no terrestrial beings to repeat his words or act on his teachings.

2. It cannot be said that the "thought-forms" would even persist *as long as* men lived to receive them. And why? Because no two people can "think" exactly the same thoughts; *there are as many Christianities as there are persons*, and the name Christianity stands not for any definite persisting standpoint, but for a myriad-faced, *always changing process*. The "thought-forms" of Jesus, Dr. Carus, a bishop, and a tramp (all "Christians") are so many different psychological phenomena; and labelling certain vaguely-resembling portions of these phenomena as "Christianity," does not at all hide their vast differences. Jesus on Comtean lines does not persist at all—he has merely *started* an ethico-psychological process which is always changing its shape. Ideas ABOUT Jesus's ideas are not the ideas of Jesus!

3. The "immortality" is of no ethical value. Men who do not believe that *they* persist after physical death will not—taking communities into view—uselessly vex themselves with painful self-culture or "progress." They will degenerate; (a consideration, however, of no relevance where the *proofs* of persistence are being discussed).

There is much else to be said against this Comtean view of immortality, but the above considerations will for the present suffice. E. DOUGLAS FAWCETT.

EDITORIAL COMMENTS.

I should have preferred to publish Mr. Fawcett's comments on my reply to his "Panlogism" without further remarks, were it not that his explanations of my view of immortality might then seem to be acknowledged by me as being correctly stated. Therefore, I wish to add a few words which shall set the reader right, at least as to the main point of the subject.

Mr. Fawcett, who regards my view of immortality as Comtean, still insists on making a difference between a man's self and his soul-forms. He grants to some extent the immortality of the latter, but he thinks that the repudiation of a self-soul as a separate entity renders it illusory. Mr. Fawcett forgets to tell us what a soul would be without its peculiar ideas, sentiments, and aspirations. He assumes the existence of two things, (1) a soul in and for itself, a monad, and (2) the life and deeds of a man. Thus Jesus would be (1) a Jesus-monad and (2) his life consisting of his preachings and the moral example he set for mankind.

According to the immortality which I proclaim, Jesus is not a self in itself which preached certain theories, but his life, consisting of his preachings and his actions, was he himself. Jesus did not have the logos, but he was the logos, the logos being the truths which appeared in him; and this logos according to the Christian doctrines of the Fourth Gospel is an eternal, omnipresent reality in the constitution of the world. The logos was before Jesus was born and continued to exist after his death. It was at the beginning and will remain forever and aye even though this earth of ours break to pieces.

Mr. Fawcett would be clearer about the true nature of the self if he only proposed to himself the question, "What am I?" "What is Jesus?" "What is Mr. Smith?" He will find upon a proper analysis that every man consists of the memories of all deeds done in his own life as well as in the lives of his ancestors. He is the product of a long process of evolution, and as he is the continuation of the past, so in the future he will be the continuation of the present. Every organ-

ism is a system of memories, and memories are the immortalised previous reactions upon the outer world; they are the preserved deed-forms of innumerable acts committed in past ages; and there is no surd left which might give occasion to the belief in a soul-monad or a self-soul, a transcendental subject, a metaphysical substratum of our being, assumed to exist in addition to the real facts of our soul-life.

It is true that everything in the world, man's soul included, is subject to change, but it is a change in which every event is preserved forever, and the laws of nature are immutable and eternal. There is a change in identity and an identity in change; there is permanence in transiency, and transiency in impermanence. The belief in something that would be absolutely permanent and absolutely self-identical (whether we call it monad, or self, or subject, or âtman) is as gratuitous as the belief in absolute transiency and absolute change.

Experience teaches us that this world does not consist of matter and motion alone, but there is a formative factor which conditions the forms, the qualities, the suchness of things. The world is regulated by law, and its formative principle depends upon definite and intrinsically necessary relations which we develop in the so-called formal sciences, especially mathematics, arithmetic, and logic. The arrangement of thoughts cannot be made arbitrarily but must, in order to agree with the reality that surrounds us, follow definite lines, and in the same way every action determines its consequences with the same necessity that causes the circumference of a circle to remain everywhere at an equal distance from its centre. The totality of such conditions as constitute the cosmic order of the world is in its religious application called the logos, and the logos is an immaterial presence, and an inalienable feature of existence, the actuality of which does not depend upon the existence of supposititious monads, or subjects, or selfs or what not.

Mr. Fawcett calls that philosophy which upholds the omnipresent reality of the logos, panlogism, and tries to replace it by his monadology. He tries to make out that the ideas we think are foreign to our being and that for instance the Logos that became flesh in Jesus would be of no account unless Jesus's soul consisted of a monad which would have to be regarded as his self. In recapitulating my views of immortality Mr. Fawcett tacitly assumes that I believe in the annihilation of this monad self in death, while I claim that such a monad self has no existence and can therefore not be annihilated, while the real facts of which we consist remain living and effective presences in our after-life.

And our after-life is as little unconscious as our present life which is the continuation of our former lives. To be sure there is a break in the continuity of consciousness in death; but this break is on the same principle as the break that occurs in sleep. Every morning we wake with fresh consciousness and renewed energy, yet the memories of our former life-experiences remain the same and their preservation constitutes the preservation of our being. Thus every new life starts with a fresh consciousness, but if we analyse its organisation we find that it consists of innumerable memories of deeds done since the remotest past in its ancestral existence.

As to the indestructibility of everything that is valuable, true, and good, we trust that if this world breaks to pieces, the Logos will reappear in other worlds. Nay, we believe that on other planets on which the same conditions prevail as on this, our earth, the Logos is present now, and it makes little difference whether he be Joshua, of the tribe of Juda, or Gotama, of the tribe of Shakya.

Whether or not Mr. Fawcett has overcome panlogism I must leave our readers to judge for themselves. P. C.

THE INTERNATIONAL SCIENTIFIC CATALOGUE, AND THE DECIMAL SYSTEM OF CLASSIFICATION.

The most notable bibliographical event of the year was the holding of an International Conference at London in July last for the purpose of considering the preparation and publication of a complete international catalogue of scientific literature. The germ of this idea originated forty years ago with a proposition made at the British Association by a distinguished American scientist, Professor Henry, and was partly realised by the "Catalogue of Scientific Papers" issued since 1867 by the Royal Society and designed to embrace all the purely scientific literature published since 1800, arranged according to authors' names. The proportions which this catalogue soon assumed, and its unavoidable bibliographical deficiencies, subsequently determined the Royal Society to undertake the preparation of a *complete systematic catalogue of all the world's publications in pure science*, arranged not only according to authors but also according to subject-matter. It was quickly seen, however, that the enormous magnitude of the plan far transcended the powers of a single organisation, and accordingly a circular was issued to all the great learned bodies and civilised governments of the world, inviting their co-operation in the consideration and execution of the scheme. For the details of the Conference we must refer our readers to the excellent report by Carl Junker in the *Centralblatt für Bibliothekswesen*, Leipsic, Vol. XIII., page 505, to the London *Academy* for August 1st, to the *Library Journal*, New York, for August and November, 1896, and also to the contemporaneous files of *Science* and *Nature*. We have only to remark that it was decided the Catalogue should be restricted to "pure" science, that its official language should be English, that it should be issued both by cards and periodical volumes, and that all the difficult questions involved in its preparation should be left to a special international committee, in charge of a central bureau at London.

The most important of all these questions, and the one that provoked the most discussion, concerned the system of classification to be adopted. The decimal system of Melvil Dewey, now director of the New York State Library, was suggested with modifications. Dewey's system, which has been in practical use for over twenty years, is so well known, so widely adopted, and recently been the subject of so much controversy, that little explanation of it is necessary. It is in use in many of the middle-sized and in most of the smaller libraries of this country, and was recently (1895) enthusiastically adopted by the International Institute of Bibliography at Brussels, Belgium, which has now its permanent working bureau. For a simple and brief account we could recommend no better source of information than Publication No. 5 of the Belgium Office (Hotel Ravenstein, Brussels), seeing that Dewey's own book is rather bulky and too detailed for the general reader.

The principle of the system is that of dividing all knowledge into ten main *bibliographical* branches denoted by the numerical characters from 0 to 9, of subdividing these again into ten more and so on *ad infinitum*, so that each branch of knowledge and each mode of knowledge has its definite and unvarying characteristic (just as a logarithm has), which can be interpreted at once by its place in the ordinal series and by the help of a comparatively simple general index. Thus 0 denotes General Works, 1 Philosophy, 2 Religion, 3 Sociology, 4 Philology, 5 Pure Science, 6 Applied Science, etc. By another subdivision, say of 5, we have respectively 0, 1, 2, 3, 4, etc. for General Science, Mathematics, Astronomy, Physics, Chemistry, etc., and by another subdivision, 530 means General Physics, 531 Mechanics, 532 Hydrostatics, etc., 535 Optics. There are further a few special marks for geographical and historical subdivisions, consisting of parentheses, colons, etc., so that 535.09(44.04), for example, is easily read as "the history of optics in France during the Revolution." The whole practical mechanism of the system, which admits of specialisation by subdivision in the enormous ratio of the powers of 10, is simply an alphabetical index and tables of general and special headings, which are repetitionary in principle. Its power and uses are not restricted to bibliography, but may be advantageously extended to *Indices Rerum*, etc.

It is evident that the system *apparently* involves a *classification of the sciences*, and this seems to have been the main ground of objection to the scheme at the London Conference, which curiously enough came principally from librarians, who have least to bother with questions of philosophy. It should not, however, be viewed as such, but should be regarded merely as what it is, *a practical scheme for arranging and indexing books*. Consequently, it can never, as has been claimed, hamper the advancement of science; for however false and illogical Dewey's classification of knowledge may be, the arrangement of books in a catalogue or on a library's shelves can at most only give difficulties to the arranging librarian or to the seeker—it can in no essential manner affect the progress of science. A perfect classification of the sciences we shall never have, and there is infinitely less probability that we shall ever have a perfect bibliographical system, for knowledge is so interrelated, its gradations and shadings are so subtle, and the caprices of authors are so great, that it is safe to say bibliographers will always be presented with substantially the same difficulties as they are to-day. The sole question is that of practical flexibility, ease and precision of consultation. These qualities the Dewey system seems to combine in a more eminent degree than any existing system, and in view of the momentous significance and inestimable practical value of the proposed International Catalogue, it is well that its merits should be strongly insisted upon and its defects thoroughly examined before rejection or adoption. At any rate we should bear in mind here that we are not concerned with a rigid philosophical scheme for classifying the sciences, but with a practical system of bibliography having no bearing whatever on the development of research.

In the first place, then, although we should not claim for the Decimal Classifi-

cation the merits of an absolute Real Character, yet there is no denying that it is essentially ideological in structure, and hence international. Secondly, it furnishes not only a bibliographical nomenclature but also a bibliographical notation which can be mechanically handled. Lastly, its power of expansion and meeting the growing needs of specialisation is unlimited, while the resultant ramifications of the system are symmetrical and entail little additional mnemonic burdens.

As to the defects they seem to pertain largely to matters of library economy, as the spatial separation of subjects nearly related (e. g., Philology and Literature), the decision of the proper category to which a book belongs, say Money or Finance, Applied Electricity and Mechanical Engineering, (a very elusive matter, generally inherent in the book and not in the system,) the treatment of subjects wherein the alphabetical system seems intrinsically indispensable, as Biography, etc. For the recital of these defects we may refer the reader to an impartial paper by W. L. R. Gifford in the *Library Journal* for November, 1896, to a letter by A. G. S. Josephson in *Science*, September 4, 1896, and to an article published last summer by M. L. Polain in the *Revue des Bibliothèques*. In its favor may be read the laudatory articles of C. Richert in the *Revue Scientifique* for April 11th and July 11th, 1896, the paper of W. E. Hoyle in *Natural Science* for July, 1896, and that of Marcel Baudouin in the *Revue Scientifique* for May 30, 1896, as also to the publications generally of the Belgian International Office.

As might be expected, the opponents of Dewey's system are strongest in the United States. And the opposition is mainly from the librarians of our large libraries, who have greater difficulties to compose and in many instances have systems of their own. Although claimed to be in use in one thousand libraries in the United States, it is said these libraries are small and not of high standing. The opposition of the great librarians should certainly be weighed by the Catalogue Committee, *in all its phases*. Furthermore, we have the authority of the abovementioned writer in *Science* that in Amherst College and Columbia University where the system was first used, "it has all been made over again."

Be that as it may, the Decimal System certainly contains the germ of a universal bibliographical notation and it is extremely probable that in one form or another it will be adopted for the new International Catalogue. Being restricted to one main division, that of Pure Science, it will avoid some of the difficulties that have perplexed librarians but bring additional others in its train. In itself the question is of considerable importance, reaching far beyond that of mere bibliographical interest, and deserves the serious consideration of all scientific workers.

THOMAS J. MCCORMACK.

BOOK REVIEWS.

THE PRIMARY FACTORS OF ORGANIC EVOLUTION. By *E. D. Cope, Ph. D.* Chicago: The Open Court Publishing Co. 1896. Pages, 547. Cuts, 121. Price $2.00.

In the year 1866 there appeared in the *Transactions of the American Philosophical Society* a paper by Professor Cope on the Cyprinoid Fishes. Among the conclusions at which he arrived in this paper were the following: The relation between the generalisation or specialisation of a type and its future progress; the parallelism between ontogenesis and phylogenesis, though he did not use these terms; the results of acceleration and retardation; etc.

The character of the results of this investigation are quoted to show the tendency of thought of the writer. While others were discussing the truth or falsehood of the theory of evolution, or its applicability in special cases, he had turned his attention to the laws of working of the process.

In 1871 in a paper on "The Method of Creation of Organic Types" he propounded a theory of "growth-force" or "bathmism"; and showed how this force, located by effort or use at certain points of the body, produces progressive evolution. Conversely disuse results in degeneration. In this essay we find also the germ, at least, of his later views concerning the importance of consciousness in evolution as the means of directing or locating this use or effort.

These are only the beginnings of a long series of papers which Professor Cope has contributed to the *American Naturalist* and other periodicals during the last thirty years. They are all characterised by the same effort to discover not merely the mode but also the causes of evolution, or more especially of variation.

In 1887 he republished the results of many of these articles in his *Origin of the Fittest*. In this book he strongly opposes the "omnipotence" of natural selection. "Selection," he says, "requires alternatives, and these are the products of "variation. Great obscurity has arisen from the supposition that natural selection "can *originate* anything, and the obscurity has not been lessened by the assertion "often made that these variations are due to inheritance. What is inheritance but "repetition of characters possessed by some (no matter what) ancestor; and if so,

"where did that ancestor obtain the peculiarity? The origin of variation is thus "only thrown upon an earlier period."

The present book would seem to have been called forth by the prominence of Weismann's theory, which is diametrically opposed to many of the author's views. It is a discussion of the theories of Preformation and of Epigenesis. "In one of these," he says, "the variations of organisms which constitute progressive and re- "trogressive evolution appear fortuitously, and those which are beneficial survive "by natural selection, while those which are not so, disappear. Characters both "beneficial and useless or harmless, which are acquired by the adult organism, are "transmitted to the young, so that no education in habit or structure acquired by "the adult has any influence in altering the course of evolution. This is the doc- "trine of Preformation. From this point of view the cause of the variations of "organisms has yet to be discovered.

"The other point of view sees in variation the direct result of stimuli from "within or without the organism; and holds that evolution consists of the inheri- "tance of such variations and the survival of the fit through natural selection. "This is the doctrine of Epigenesis. To this I would add that in so far as sensa- "tions or states of consciousness are present, they constitute a factor in the pro- "cess, since they enable an organism to modify or change its stimuli. . . . My aim "will be to show in the first place, that variations of character are the results of "physical causes; and second, that such variations are inherited." (Pp. 13, 14.)

The first chapter of the book treats of variation. Here a large number of cases are adduced to show that "variations are not promiscuous or multifarious, but are of certain definite kinds or in certain directions. (P. 22.) The second chapter containing a little less than one hundred pages, is devoted to phylogeny; twenty-five of these to the more immediate ancestry of man.

This is one of the most interesting, and the most tantalising, of all the chapters of the book. The phylogeny of the classes of vertebrates is discussed in about sixty pages. The phylogenetic charts of the different classes are clear and not confused by unnecessary details. The author is a master of the science of recognising what he can afford to leave out; a science of which most writers seem to be woefully ignorant.

It is interesting to compare this chapter on phylogenesis with Haeckel's *Phylogenie der Wirbelthiere* published a year or more ago. The German scientist gives us a volume of some six hundred large pages. There is no attempt at condensation. The style is delightfully easy and flowing. Paper and ink are abundant and he writes for readers who do not like to be hurried. Wherever the actual ancestor of a line of descent has not yet been discovered, the author reconstructs a hypothetical ancestor. And this hypothetical ancestor "must have existed"; there is no doubt about his existence or characteristics. The connexion and the progressive modifications of the different lines are always clear.

Every new term is carefully explained. The gaps are bridged; the difficult

places smoothed and straightened; and we read easily, pleasantly, and without effort. The boundary line between the actual and the hypothetical, between the "is" and the "must be," is not always sharp. But we comfort ourselves with the thought that Professor Haeckel's guesses are very shrewd, and that they have usually been verified by later discoveries.

Our American writer, in his lines of vertebrate phylogenesis, sticks as closely as possible to the facts of palaeontology. The statements are very brief, the anatomical terms are rarely or never explained. New names for great groups of animals are introduced with the briefest definitions possible. The chapter is, it must be confessed, hard reading. And even when we have finished it we are not quite sure as to just what sort of animals, for example, the Cotylosauria were, or how they differed from the Theriodonta. And much the same is true, though in less degree, of the section on the phylogeny of mammals.

The account of the phylogeny of the horse closes with the statements that its "history may be duplicated in manner and mode, by the lines of the camels, the "dogs and bears, the cats, the beaver, etc." And "examination of all these lines "reveals a certain definiteness of end and directness of approach. We discover no "accession of characters which are afterward lost, as would naturally occur as a "result of undirected variation." (P. 149.)

One cannot but feel that the argument of the book would have been strengthened if the author had given us a history of others of these narrower lines of mammalian development, even at the expense of leaving out the discussion of vertebrates in general.

For in this chapter the author seems to the ordinary mind to have undertaken the impossible. The chapter should be expanded to a volume, and "writ large" so that all could understand. When we remember how largely the material for mammalian phylogeny has been discovered in America and studied by American palaeontologists; when we notice the striking similarity between many of the charts of Haeckel's *Phylogenie* and those published more than ten years ago in Cope's *Origin of the Fittest;* when we remember further the numerous references to the author's investigations by Professor Zittel in his *Palaeontology;* we feel that we have a just claim on the author of this book for a work on Vertebrate Phylogeny, and that "t'were well 'twere done quickly."

The third chapter discusses the parallelism between ontogeny and phylogeny, and the fourth chapter treats of Katagenesis or degeneration. Here the relation between degeneration and akinetogenesis, or lack of use or effort, is well presented.

In the second part of the work the author treats of the Causes of Variation. He says "I propose to cite examples of the direct modifying effect of external in-"fluences on the characters of individual animals and plants. These influences "fall naturally into two classes, viz., the physico-chemical (molecular), and the "mechanical (molar). The modifications so presented are supposed to be the re-"sult of the action of the causes in question continued throughout geologic time.

"To the two types of influence which thus express themselves in evolution, I have "given the names Physiogenesis and Kinetogenesis."

The chapter on physiogenesis contains a very interesting series of observations of the effect of light and color on animal coloration. But the chapter might well have been longer. The author has selected rather too sparingly from the wealth of illustrations which he had at his command.

Chapter VI. treats of Kinetogenesis or the effects of use and disuse. This is the longest and, all in all, the most interesting chapter in the book. The author discusses the shells of mollusks, the effects of use on muscles, the results of impacts and strains on bones, the origin of dental structures, and other important subjects. The argument is clear, strong, and convincing. The chapter contains also an admirable account of the origin of osseous vertebrae.

The third part of the volume treats of the inheritance of variation. In the chapter on Heredity the hypothesis concerning the mode of inheritance of acquired characteristics is stated with remarkable clearness and precision. The author says: "The effects of use and disuse are two-fold, viz.: the effect on the soma, and the "effect on the germ-plasma. Those who sustain the view that acquired character-"istics are inherited, must, I believe, understand it as thus stated. The character "must be potentially acquired by the germ-plasma as well as actually by the soma. "Those who insist that acquired characters are not inherited forget that the char-"acter acquired by the soma is identical with that acquired by the germ-plasma, "so that the character acquired by the former is inherited, but not directly. It is "acquired contemporaneously by the germ-plasma, and inherited from it. There "is then truth in the two apparently opposed positions, and they appear to me to "be harmonised by the doctrine above laid down, which I have called the Theory "of Diplogenesis, in allusion to the double destination of the effects of use and dis-"use in inheritance." (P. 443.)

The whole chapter is so full of facts, thought, and suggestion that no one quotation can do it justice. But some of the evidence adduced for the inheritance of acquired characters seems decidedly weak.

The chapter on the Energy of Evolution is especially interesting for its logical tendency. The author divides the energies manifested by living beings into those which "tend away from, and those which tend toward, the phenomena of life." The latter or anagenetic class is exclusively vital, and tends to upward progress, in the organic sense, that is toward the increasing control of its environment by the organism. The former class, composed of the catagenetic energies, is physical and chemical. "The catagenetic energies tend to the creation of a stable equilibrium "of matter, in which molar motion is not produced from within, and sensation is "impossible. In popular language, the one class of energies tends to life; the "other to death." (P. 475.) In another passage he says, "I have given to that "energy which is displayed by the plant in the elaboration of living from non-living "matter the name of antichemism."

The discussion of this apparent "dualism" is exceedingly suggestive, but it is too long to give in full, and mere quotations would only do it injustice.

One great merit of the author's writings is that, while he never undervalues the importance of mechanical processes in evolution, he always emphasises the importance of mind. The Function of Consciousness is well treated in the tenth chapter. "Consciousness was coincident with the dawn of life." "It has pre-"ceded in time and in history the evolution of the greater part of plants and ani-"mals, both unicellular and multicellular. It appears also that, if kinetogenesis "be true, consciousness has been essential to a rising scale of organic evolution." "I think it possible to show that the true definition of life is, *energy directed by "sensibility, or by a mechanism which has originated under the direction of sensi-"bility.*" (Pp. 508–513.)

Every action was primitively the result of conscious effort and "the mechanism which does the work has developed as the result of the animal's exertions under stimuli."

This is good common sense and sound logic.

We must make just one more quotation: "Why should evolution be progres-"sive in the face of universal catagenesis? No other ground seems discoverable "but the presence of sensation or consciousness, which is, metaphysically speaking, "the protoplasm of mind. The two sensations of hunger and sex have furnished "the stimuli to internal and external activity, and memory, or experience with "natural selection, have been the guides. Mind and body have thus developed "contemporaneously and have mutually reacted. Without the co-operation of all "these factors, anagenesis seems impossible."

The book closes with a brief chapter on the Opinions of Neo-Lamarckians.

It is impossible to give in a brief space an adequate outline of such a book, for the wealth of facts and arguments, of new thoughts and suggestions, has to remain almost unnoticed. Professor Cope is a peculiarly suggestive writer. Old theories are viewed in a new light, are analysed or put in a new or modified form. Scattered all through the book are facts or hypotheses, sometimes bearing only very indirectly on the argument of the chapter, which are full of food for thought.

The chapter on Phylogeny ends with a section on the Law of the Unspecialised, a condensed but very clear presentation of the fact that higher types have always sprung from generalised forms. This law ought to be more widely promulgated in these days of extreme specialisation; for almost every one considers it a "dead letter." But, if true of physical evolution, and our author certainly very nearly demonstrates it, why should it be false in the evolution of the individual mind?

The frequency and importance of small size in progressive lines, especially in mammals, is stated in a single sentence of the same section. Other illustrations are the hypotheses concerning the origin of lungs and of bony vertebrae. The

hypothesis concerning the origin of the rhachitomous vertebra, and its illustration are especially worthy of notice in this connexion.

On page four hundred and forty-four sexual reproduction is considered advantageous "on account of its increased opportunity of variation." But is it yet certain that sexual reproduction does not work rather to hinder than to increase variation in the group or species? Does not the intercrossing of forms which have been exposed to different conditions, and which are therefore tending to diverge, result in holding the species as a whole somewhere near a golden mean of structure and progress? Is not one great danger of the intercrossing of closely related forms to be found in the fact that thus individual tendencies of variation are enhanced until they are abnormal and injurious? Indeed, does not nature, so to speak, have to keep a brake on the too rapid variation of the central, ascending phylogenetic line leading toward man, lest too many of its members rapidly become specialised and thus unproductive of anything higher? There are doubtless other, perhaps even more effective, hindrances to specialisation; but does not sexual reproduction work with these rather than against them? This, if we remember rightly, is Hatschek's view; but we may do him injustice.

The whole book is a marvel of condensation. It is a storehouse of facts, arguments, and suggestions; but it is so condensed that it is not easy reading. It is very pleasant to come across a scientific article or book where the chaff has been carefully removed. They are exceedingly rare, but even the virtue of condensation may be exaggerated into a fault. One must read it chapter by chapter. Like some condensed foods, it requires good powers of digestion in the user.

It is moreover the work of a thorough palaeontologist as well as profound student of comparative anatomy. Hence it has a special place and value.

But Weismann is a very skilful and wary antagonist, and seems to have a defence for every attack. If the palaeontologist can show that variation is really linear, Weismann's theory is disproved. And Professor Cope has given us lines of mammalian evolution, for example, traced out with great clearness; and they are proven with a vast amount of acumen, skill, and patient observation. It is dangerous to try to imagine just what a follower of Weismann would say about any subject for the theory is not only complex but also protean; it changes front to every new attack. But might he not make the following objection with some justice? Of all the formerly existing individuals of a series of species of vertebrates the palaeontologist has but few specimens and these collected from a comparatively narrow area. His material is too scanty to give him any adequate conception of the amount of variation of which the species at any one stage was capable. When more material has been collected the variation of any species at each stage may yet prove to be fortuitous. The forms which survive through successive periods of time, or through a series of stages of evolution naturally form more or less straight lines of variation, for these lines are favored by natural selection. But this linear survival is entirely compatible with a fortuitous variation. Is it not at

present an almost necessary result of the character of the two fields of study that the zoölogist should have the advantage in the study of variation, and the palaeontologist in the study of survival and hence of phylogeny? And that parallel lines of survival should be fostered in different groups by natural selection from fortuitous variation need not surprise us.

This objection may not apply to inferences drawn from the teeth of mammals for here the palaeontologist may have vastly more material than we have supposed. And the most devoted follower of Weismann must feel surprise that the lines of survival are so straight and with so few branches. We cannot fail to notice how largely the palaeontologists are Neo-Lamarckians.

In the emphasis placed on consciousness, will, and effort, this volume is a most valuable and timely contribution. Students of evolution have too generally represented not only vital processes but even life itself as almost or quite purely mechanical, molecular, or chemical. Hence they have either neglected or slurred all its mental aspects. They have sought the living among the dead until they forget what life is and what are its chief characteristics. For supremacy of mind over material, and finally over itself, is the evident goal of evolution. All such purely mechanical or chemical theories, when applied to human progress, necessarily proved misleading or useless.

But when life is defined as "energy directed by sensibility," each of its aspects has received its due emphasis. Well may the author claim that "from this point of view the study of the evolution of mind and its relation to the organic world assumes a new importance."

Now and then the book reminds us of the writings of the Apostle Paul; "in which are some things hard to be understood, which they that are unlearned wrest unto their own destruction." Bathmism we can remember, and its meaning also. But what of Statogenesis, Emphytogenesis, Autobathmogeny, Mnemogenesis, and Cryptopnoÿ? If even Mephistopheles had seen these and sundry other compounds which occur in the volume, he could hardly have found it in his heart to urge an unsuspecting student to "learn words."

Any one who will read this book carefully and thoughtfully cannot fail to have a new, and clearer, and more just, conception of the factors and the process of evolution; and will find his mind continually stimulated to think along new lines.

JOHN M. TYLER.

OSTWALD'S KLASSIKER DER EXAKTEN WISSENSCHAFTEN. A Serial Publication, at Present Embracing More than Eighty Works in Mathematics, Physics, Astronomy, Chemistry, Crystallography, Botany, and Physiology. Edited by Prof. Dr. *Arthur von Oettingen*. Leipsic: Wilhelm Engelmann.

The impression is a widespread one in the popular mind that novelty in science, like novelty in the practical arts, constitutes by the very fact and virtue of its novelty an advance upon the old, supplanting and undoing it. The popular mind,

and with it its reflex popular pedagogy, is in error here, in error principally by its inability to grasp the salient and fundamental features differentiating knowledge, and secondarily by its utter lack of sense for the exigencies of historical and cosmical development—a joint, or rather disjoint, mental condition which leads people lower in the scale of intelligence (say our school-boards) to welcome revisions of the multiplication-table with the same unfeigned delight that the biologist does modifications of Dr. Weismann's theory of heredity. The sciences exhibit varied degrees of *a priority* and formal rigor ranging from arithmetic to psychology, their development has not been contemporaneous, and consequently they are not all at the same stage of perfection. In some we can hope for but little more than new and ingenious presentations, while in others we may expect at any day astounding revelations. We must distinguish between the two classes of knowledge. In the former it is not likely that the same pitch of excellence will again be attained, that we shall ever again in these departments reach the same naturalness and power of thought or the same beauty of exposition—for the sufficient reason that genius will never again apply itself to these departments with equal fervor. The very necessity of such application is wanting, for a truth once discovered remains a truth forever, and is not in need of rediscovery. Such is one of the considerations which in certain branches of knowledge, and under certain restrictions, turns our glance to the past.

But there is another. In this decadent age, with its tendency to intellectual democracy, when every Tom, Dick, and Harry may yield to the unholy impulse to mutilate science, the prime necessity in the spirit which shapes research is a sane conservatism. Not a conservatism which cleaves slavishly to old ideals and methods, which apotheosises old models and stifles the impulses of originality, but a conservatism which ever keeps before the student's mind the marks of high achievement and lofty standards, and holds to his ears the memory-ring of true genius. We are concerned here merely with the plea, which all history confirms, that it is not given to every man and age to reach Olympian heights in their performances, but that some are preferred before others. That aggregation of the cosmic elements which went to make a Michael Angelo, a Kepler, a Shakespeare, or a Kant, is not compacted by the Divine Artificer or *Zeitgeist* in every age of the world's history, though it may be in the making to-day or to-morrow. Inevitably, therefore, and as it were by the very eccentricities of the universe, by the very conditions of intellectual evolution, we are led back to the Golden Ages of Science, Art, or Literature whenever we would seek our highest inspiration and culture.

Some such objects as these, at least on the æsthetical and theoretic side, it is the purpose of Ostwald's Series of Scientific Classics to promote. The series itself is, in its department, one of the most important and deserving enterprises which have been undertaken in recent years. It derives its name from its original editor, Dr. Ostwald, who, on the assumption of that post by Dr. Arthur von Oettingen, likewise an indefatigable scholar, has not ceased his collaboration, but still con-

tinues to enrich the series by selections, translations, and special editorial work. Having originated with a man who, as his recent utterances show, is keenly alive to the stupendous practical import of science, the philosophical, æsthetical, and purely historical ends which the series may primarily seem designed to satisfy, are extended in their significance so as to embrace broad practical aspects of the scientist's culture.

We shall now address ourselves to the contents of the series, beginning with mathematics, and taking up first the Calculus of Variations. It will be profitable here to quote, on the advantages of historical scientific study, the words of Robert Woodhouse, a Cambridge mathematician, the original pioneer in this department, who, in his *Treatise on Isoperimetrical Problems*, published in 1810, after mentioning the stimulus afforded to the student's curiosity and attention by a combination of historical and systematic researches, says:

"But other advantages, besides that of an excited attention, may accrue to "the student from the present plan. He will have an opportunity of observing "how a calculus, from simple beginnings, by easy steps, and seemingly the slight-"est improvements, is advanced to perfection; his curiosity, too, may be stimu-"lated to an examination of the works of the contemporaries of Newton; works "once read and celebrated: yet the writings of the Bernoullis are not antiquated "from loss of beauty, nor deserve neglect, either from obscurity, or clumsiness of "calculation, or shallowness of research. Their processes, indeed, are occasion-"ally somewhat long, and want the trim form of modern solution. They are not, "however, therefore the less adapted to the student, *who is solicitous for just and "full views of science*, rather than for neat novelties and mere store of results. In-"deed, *the authors who write near the beginnings of science are, in general, the most "instructive; they take the reader more along with them, show him the real difficul-"ties, and, which is the main point, teach him the subject, the way by which they "themselves learned it.*"[1]

For this study, and precisely on the subject Woodhouse had in mind, we have in numbers 46 and 47 of Ostwald's Series abundant material. The initial isoperimetrical problems of the Bernoullis are given, the *Methodus inveniendi* of Euler, the two papers of Lagrange, and the two of Legendre and Jacobi. Wholly apart from its scientific importance, there is scarcely a chapter in the history of research that can compare with that of the Calculus for Variations in its intensely human interest. The challenges and strife of the Bernoullis, ending in a bitter feud between the two brothers, the magnanimous generosity of Euler, at that time prince of European mathematicians, who withheld the publication of certain researches till the young Lagrange should publish his, that the latter might not be robbed of "one iota of the rightful fame" due to him for his exquisite solution—all combine to make this period of mathematical history entrancingly interesting. Euler's letter

[1] Italics are ours.

is a model of the scientific attitude. "Your analytical solution of the isoperimetrical problem," he writes to the boy who was thenceforth to share his laurels, "leaves "nothing to be desired in this department of inquiry, and I am delighted beyond "measure that it has been your lot to carry to the highest pitch of perfection a "theory which I have been almost the only one to cultivate from its inception."

Or take another incident. Of the numerous problems which John Bernoulli showered upon the mathematical world in the latter part of the seventeenth century, and which were generally supposed to have been aimed at his brother James, the most famous and the one fraught with the greatest significance for science, was that of the brachistocrone, or the curve of quickest descent. It was answered by Leibnitz, Newton, De l'Hospital, and by James Bernoulli, the latter of whom retorted by a counter-challenge involving a more general problem, and ended by adding that since it was unjust that any one should go unrecompensed for labor on behalf of another and to the detriment of his own affairs, a gentlemen for whom James would vouch pledged himself to give his brother meet praise and fifty ducats besides, provided the latter would furnish a solution of the problem within three months and publish the same within a year. The time-limit John did not take advantage of, but published his solution immediately, saying that "instead of three months it had only taken him three minutes to penetrate the whole mystery." But in one point he had erred. James, to the terror of his brother, increased his wagers in geometrical proportion, and when John ultimately refused to revise his solution on the plea that his time was much better occupied in making new discoveries, gave the crowning retort-courteous in the reply "that if in *three minutes* he had solved the whole mystery, surely *six minutes* more would not much diminish the number of his discoveries." The wrangling of the two brothers continued till the death of James. It had its dark sides, but from its very passion was unusually fruitful for science. We may add that the view of John's unfairness taken by English historians is not wholly accepted by Cantor. Not all the material of the Bernoulli feud is given in the two *Classics* under consideration, but only the initial programmata: the rest is devoted to the modern developments mentioned.

We have also to mention in mathematics the two *Treatises on Spherical Trigonometry* (No. 73) by Euler, which are fundamental in their department. The didactic works of Euler are available to-day as text-books; and, notably in trigonometry, little has been added to the science since his time. His diffuseness is scarce a fault, and it is a significant comment on the methods of discovery that, though many of his demonstrations lack the boasted modern rigor, yet the theorems themselves have generally withstood all assault. On the other hand, the naturalness and lucidity of his explanations might well be readopted in modern instruction. Euler traversed like a conqueror the entire domain of mathematics, transforming and augmenting it at every step. Creator and systematiser, he left everywhere his giant impress. With him, therefore, and particularly in our days of specialisation, intercourse is quickening and chastening.

The other mathematicians represented in the Series are Gauss, Steiner, Jacobi, Abel, Bravais, Laplace, Dirichlet, Charles Ivory, Rosenhain, and Göpel.

We come now to Physics. The first works to claim our attention are: (1) the *Dialogues* of Galileo, in three small volumes (Nos. 11, 24, and 25),[1] admirably translated by Dr. Oettingen, and (2) Huygens's *Treatise on Light*, translated by E. Lommel. The *Dialogues* of Galileo rank as one of the loftiest achievements of the human intellect. They are as perfect in their literary form as they are momentous in their contents, and mark the real beginning of modern science. "They did not," says Lagrange,[2] "procure for Galileo, during his lifetime, the celebrity of his discoveries in the heavens, but to-day they constitute the solidest and realest portion of his transcendent glory. The discovery of the satellites of Jupiter, of the phases of Venus, of the spots of the sun, etc., required but telescopes and assiduity; but extraordinary genius was necessary to disentangle the laws of nature from phenomena which philosophers had always had before their eyes, but whose explanation constantly eluded their efforts." We can grasp Galileo's gigantic performance only by transplanting ourselves to the time in which he lived, by contemplating its absolute intellectual dependence on authority, and by recollecting that he worked almost entirely without instruments. One is struck by his unfailing common sense and insistence on practical points of view, his grace and lucidity of presentation, his simplicity and directness (a point in which he is the direct opposite of Kepler), and by his skilful manipulation of the cumbersome mathematical methods of his time. The inspiration to be derived from these volumes is surpassed only by the insight which they afford into the workings of the archetypal inquiring mind. In this their psychological value they stand without a peer.

Huygens is the second brightest star in the scientific firmament of the sixteenth century. He continued and supplemented with equal genius the work of Galileo, and founded in his *Horologium Oscillatorium* the second parallel development of mechanical ideas which ended in the modern doctrine of energy. He is represented in Ostwald's Series by his famous *Traité de la Lumiere*, which laid the founeations of the modern undulatory theory of light and which shows at their best the brilliant qualities of his mind. So powerful was the thrall of Newton's genius—even on its mightiest side it deadened the mathematical development of England during a whole century—that under the shadow of the corpuscular theory Huygens's ideas, despite their simplicity, remained undeveloped for fully three generations. The historical significance of the *Treatise* goes without saying; its disciplinary value is equally high. The masterly exposition of the facts and law of double refraction in Chapter V., says Lommel, is instructionally superior to that of the best of modern text-books. The *Horologium Oscillatorium* is missing from the series, but it is hoped the deficiency will soon be supplied.

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[1]The prices of the volumes of the series vary according to the size. Full catalogues may be obtained by addressing W. Engelmann, Verlagsbuchhandlung, Leipsic, Germany.

[2]*Mécanique Analytique*, Vol. I., p. 237, Collected Works, Paris, 1888.

Notable, also, are the *New Magdeburg Experiments* of Otto von Guericke (No. 59), with their quaint drawings, their ponderous and costly equipments (the Bürgermeister spent 20,000 thalers on his apparatus and received as honorarium for his published work only a few free copies), and lastly with their delightful glimpses into the industrial life of the seventeenth century. The third book only of the work is published and contains the experiments on atmospheric pressure substantially as they are given to-day in the elementary school-books.

In No. 57 we have Fahrenheit, Réaumur, and Celsius's papers on *Thermometry*. It is curious to note that the mark 100° was originally placed by Celsius at the freezing point, and 0° at the boiling point.

Lambert's *Photometry* takes up three volumes (Nos. 31, 32, 33). Lambert was a foremost member of that brilliant band of talented men which made the eighteenth century a classical period in science. His versatility is remarkable, and as he was almost entirely self-taught and worked the fields of knowledge after his own sturdy fashion, he is both original and instructive, but at the same time diffuse. He was concerned mostly with general points of view and negligent in his experiments. His entire apparatus while constructing his *Photometry* (which is a pioneer-work in its branch) consisted of three little mirrors, two lenses, a pair of glass plates, and a prism. He persisted in using these instruments even in Berlin, where the best apparatus stood at his disposal, and his skill in the manipulation of his tools is remarkable. The treatise on *Photometry* is largely antiquated, yet the charm of its originality, its solid nucleus of truth, still render it a readable work. "Delivered to-day," says the editor, E. Anding, "it would, despite its diffuseness, specialisation, and repetitions, form an excellent lecture-course in photometric methods." Lambert's character and heart are highly lauded by his contemporaries, and it is said that his fine countenance gave Lavater the first suggestion and stimulus to his physiognomical studies.

An extremely important number is that devoted to the researches on the *Expansive Law of Gases* (No. 44), and containing the papers of Gay-Lussac, Dalton, Dulong, Petit, Rudberg, Magnus, and Regnault. This succession of researches, comprised within the modest compass of 200 pages, is intimately connected with the enunciation of the notion of absolute temperature, and constitutes by the vicissitudes of its development one of the most instructive chapters in the history of science.

Number 63 is devoted to the first researches in Electromagnetism and contains Oersted's brief account of his discovery of the deflexion of a magnetic needle by an electric current, as also an abstract of Seebeck's lectures on the Magnetism of the Galvanic Circuit.

The extraordinary work of Sadi Carnot, *Réflexions sur la puissance motrice du feu*, etc., forms No. 37. Carnot died at the early age of thirty-six (at the same age as Hertz), and his work, though containing the germs of much that was necessary to the formulation of the principle of the conservation of energy, lay almost

unnoticed for a quarter of a century. If we could interpret Carnot's ideas by the right intellectual environment we should be justified in denominating him the discoverer of the important principle known as the first law of thermodynamics. It is certain that his methods led to its discovery and that his work contains substantially the material now formulated in the second law. Carnot's results were known to Helmholtz, whose treatise on the Conservation of Force, with Helmholtz's own notes, edited in 1889, forms the first issue of Ostwald's *Classics*.

Finally, we have in Physics and Astronomy the Spectrum Analysis of Kirchhoff and Bunsen, Gauss's researches on Terrestrial Magnetism and on Forces Acting Inversely as the Square of the Distances, Bessel on the Length of the Second's Pendulum, Neumann on the Mathematical Theory of Induced Electric Currents, Kant on the Theory of the Heavens, Coulomb, Galvani, Hittorf and Seebeck on Electricity and Magnetism, Lavoisier and Laplace on Heat, and so on. In Botany and Physiology but few numbers have as yet appeared. They are essays by Saussure, Pasteur, Kölreuter, Sprengel, Knight, Weber, Ludwig, Becher, Rahn, and Ernst Brücke.

The department of Chemistry alone remains. As might be expected, it is richly represented. The *Dissertation on Fire and Water* (No. 58), by Carl Wilhelm Scheele, the Swedish chemist, written in 1777, remains to-day a marvel of simplicity. A person of common education may read the little book and repeat its experiments with the instruments and ideas which every-day life affords. Scheele, in Ostwald's opinion, possessed the distinctive qualifications of the chemist in their highest development, his experimental skill and powers of inference having never before or since been reached. No. 3 gives the treatises of Dalton and Wollaston on the Atomic Theory. The papers of Dalton are interesting as showing how with inexact analysis and experiments Dalton's thought yet compassed and enunciated so important a principle as the atomic hypothesis. We have here also the first table of atomic weights and the enunciation of Dalton's important theory of the constitution of bodies, and his law of constant and multiple proportions. The paper of Wollaston supplements Dalton's work, and gives experiments that for facility and cogency may be regarded to-day as the best experimental demonstrations of Dalton's laws. It is perhaps unknown to the majority of students that Wollaston was the first who attempted to draw up a more exact picture of the nature of chemical combination by the spatial disposition of atoms.

The speculative researches of Avogadro and Ampère on the foundations of the molecular theory are given in No. 8, the researches of Berthollet on the laws of affinity in No. 74, and the famous investigations of Berthollet's pupil, Gay-Lussac, on iodine in No. 4. Gay-Lussac's paper is accounted the most perfect and exhaustive original investigation of a single chemical element that exists. The discovery of a new element has never been exploited with such thoroughness as in this monograph of the great French chemist. The series also contains the treatises of

Meyer and Mendelejeff, and dissertations by Liebig, Bunsen, Pasteur, Berzelius, Davy, etc.

In the case of many of the older investigators, the editors of the Series have reproduced only what they deemed important. The Series is not, therefore, in all cases a *full* reprint of the scientific classics. It might have been desirable, further, to print the texts of the originals along with the German translations. Although probably not warranted from a commercial point of view, this step would have made the Series international in its character and usefulness. Altogether, we cannot close without words of high commendation for the undertaking, nor without expressing the hope that its range of usefulness will be extensive and its fruits beneficent.

THOMAS J. MCCORMACK.

VORLESUNGEN UEBER GESCHICHTE DER MATHEMATIK. By *Moritz Cantor*. Leipsic: B. G. Teubner. 1894–1896. Price, Vol. I., 22 Marks; Vol. II., 24 Marks; Vol. III., Two Installments, 12 Marks.

It would be impossible to do justice to this monumental work within the brief limits of a book review, even if the task were not rendered supererogatory by the high standing of the work and the acknowledged authority of its author. Cantor's *Lectures on the History of Mathematics* are the work of a man who has unswervingly devoted a life-time to this single task, who thirty-three years ago was well known for his important contributions to this subject, and who can now in the second edition of the first volume of his great work point with pride to the impulse and awakened interest which his endeavors have aroused in the historical studies of his science. He has had many predecessors, each of whom has distinguished himself in certain branches and by certain excellences—Montucla who excelled in lucidity, elegance, and popularity; Libri who seems to have united in an eminent degree all the qualities necessary to the makeup of a writer of a universal mathematical history, but whose work extends only to the period preceding Galileo in Italy; Hankel, whose contributions to the history of early mathematics are marked by much acumen; and several others. Nevertheless, it may safely be said that profundity, accuracy, and extensiveness of treatment have never before in any history of mathematics been so thoroughly and intimately united as in the three volumes constituting these *Lectures* of Moritz Cantor. The first volume embraces the period from earliest antiquity to the year 1200 A. D. and is now in its second edition, thoroughly revised and brought down to date (1894). The second volume embraces the time from 1200 to 1668 A. D. The third and last volume will comprise the time from 1668 to 1759, concluding with the first epoch-making papers of Lagrange in the Proceedings of the Turin Academy. The first two installments only of this third volume have appeared (1894–1896), the third is still in preparation.

In the Introduction to Volume I., which contains 883 pages with a chart of ancient numerical characters, we have some brief philosophical considerations concerning the psychological origin of mathematical operations and the invention

of numerical signs. As to the theory that the first numerical words originally denoted not numbers but definite objects, Prof. Cantor remarks that philology has not succeeded in proving its position. Nor can he himself offer much to the solution of the problem. We are on sure ground, he says, only when we come to derivative numerical words. We have also some interesting remarks on the various systems of numbers, namely, the decimal, vigesimal, undecimal, sexigesimal systems, etc. The true history of mathematics, the author contends, begins only with the first written monuments and inscriptions which are presumably found in Egypt. 55 pages are devoted to the mathematics of Egypt, 31 to that of the Babylonians, 65 to that of the Indians, 29 to that of the Chinese, and 118 to that of the Arabs. The remaining three divisions of the first book are devoted to the mathematical achievements of the Greeks, which naturally take up the largest space, and to those of the Romans and of the early mediæval monasteries. The researches of the ancient nations are extremely interesting, not only from the point of view of mathematical history but equally so from that of philosophy and psychology. Their insight and errors are of extreme importance, and it is both profitable and fascinating to witness the primitive operations of the human mind as employed upon this its surest and most fundamental subject. Of the Greeks the most interesting chapters are those relating to Pythagoras and Archimedes. Dr. Cantor gave long ago, in his *Mathematische Beiträge zum Kulturleben der Völker*, 1863, a charming appreciation of the life and achievements of Pythagoras, only differing from the chapter on the great philosopher in the present work by being more popular and less exhaustive. In Archimedes we have the man who may be regarded as the incarnation of the mathematical genius of antiquity, and the chapter devoted to him shows at its best the precious heritage which he left to us. It is surprising to note to what a pitch the Indians advanced arithmetic and algebra, and also to follow the work of the Arabs. In fine, the entire first volume is a book which can be read and consulted by writers of average elementary mathematical attainments, and offers material from which all readers may draw profit and entertainment.

The year 1200 was an important one in the history of European Mathematics, and is fitly chosen as the beginning of the second volume. Christianity was then in possession of the art of arithmetic, as it had been recovered from its different ancient and Eastern sources. It was also in possession of the zero and of the the no less important principle of the positional value of figures. Algebra, as far as equations of the first and second degree, had been compassed, the geometry of Euclid, the astronomy of Ptolemy, the writings of Theodosius, and of Menelaus, existed in Latin translations, and appositely to the right time came the right men who were destined to achieve great things in mathematical science,—Leonardo of Pisa and Jordanus Nemorarius.

"Leonardo," says Cantor, "was a practised arithmetician and geometer, an ingenious algebraist, conversant with the application of algebra to geometry, as well as a creative genius of high rank in the theory of numbers." Jordanus

Nemorarius was a priest and member of a powerful order; he fell little short of Leonardo in point of mathematical ability, but by reason of his ecclesiastical position his influence was more powerful and decisive than that of the other who was a merchant. From these two great landmarks the second volume traces the history of mathematics through the early developments of algebra and geometry in England, France, Italy, and Germany, including Nicolaus of Cusa, Regiomontanus, Leonardo da Vinci, Luca Paciuolo, Michael Stifel, etc., down to the researches on cubic equations by Cardano and Tartaglia, where the first installment ends. The second installment is devoted to the advances made in cyclometry and trigonometry by Vieta, Van Roomen, etc., to the researches on equations of the fourth degree by Bombelli, etc., Kepler's and Pascal's investigations in geometry, the rise of mechanics, logarithms, continued fractions, the theory of numbers, analytical geometry, and lastly to the germs of the infinitesimal calculus in Kepler, Cavalieri, and most notably of all in Fermat. The volume concludes with the year 1668–1669, a momentous epoch in the history of mathematics, for at that time Gottfried Wilhelm Leibnitz was publishing at Leipsic his Doctor's dissertation, and Isaac Newton had just been elected to the chair of Mathematics in Cambridge University England.

With this epoch the second volume begins. The period which follows is of all that of most import for modern mathematics, and its utterances are associated with the most interest for professional readers. The first installment deals with the "geometrical character" of Leibnitz, with certain developments of commercial arithmetic, with the history of series as developed by Mercator, Brouncker, Gregory, Newton, Leibnitz, Halley, De Moivre, James Bernoulli, with continued fractions, the theory of curves, etc. We have also in this installment a chapter on Newton and Leibnitz's first discoveries in the domain of the infinitesimal calculus, chapters on Leibnitz and on the brothers Bernoulli both preceding and during their famous strife. The great controversy concerning the priority of invention of the differential calculus between the followers of Newton and Leibnitz,—a controversy which excited the mathematical world for more than twenty-five years, and which was really not definitively settled until the present century,—takes up a good part of the second and latest installment of Cantor's third volume. There is now, of course, little to be said upon the subject of this controversy, and Cantor does not claim to add much to its elucidation, except to point out an omission made in the copying of a letter by Leibnitz to Wallis of the word *hodie*, which might easily have led to certain suspicions in the English mind as to Leibnitz's fair dealings. His conclusion is that now that both great inquirers have received their just share of the credit owing to them for their discoveries, a careful and unprejudiced examination of the controversy unfortunately shows that the conduct of the matter reflected no little discredit upon *all* parties concerned. The last installment closes with the developments of the calculus, of Algebra, and of analytical and projective geometry down to the year 1726. The work of Euler and his period remains.

Cantor's history now comprises 2218 pages. The final installment, reaching to the year 1759, and which is yet to appear, will certainly not increase its bulk to much over 2600 pages, leaving the vast material from the date of Lagrange's first memoirs on to be elaborated by another hand. The history will thus hardly exceed in size some of its predecessors, but it will contain proportionately more material, from its being almost exclusively devoted to the solider scientific aspects of its subject and not so much to biographical and personal details, which served so greatly to swell the work of Montucla. In fine, it is far and away the concisest, yet most comprehensive and authoritative treatment of the subject that we have. As such, it is the indispensable adjunct of every mathematical worker and absolutely necessary in every mathematical library. T. J. McC.

PHYSIKALISCH-CHEMISCHE PROPAEDEUTIK. Unter besonderer Berücksichtigung der medicinischen Wissenschaften und mit historischen und biographischen Angaben. Von *Professor Dr. Med. et Phil. H. Griesbach.* Erste Hälfte. 272 Pages. Price, M. 6. Zweite Hälfte, I. Lieferung, 320 Pages. Price, M. 7. Leipsic: Wilhelm Engelmann. 1895 and 1896.

The present work is in the nature of an encyclopædic introduction to medicine, and deals with the specific chemical and physical facts, as well as methods, which enter into the foundations and structure of that science. The work is published in two parts, comprising three installments of some 300 pages each, and covers an unusually vast field. Its author is a man of scientific attainments and of wide and profound bibliographical knowledge. He has materially added to the attractiveness of the work by interweaving with his expositions a great mass of biographical and historical data. Each subject treated acquires thus a developmental form, well adapted to strengthening the memory of the student for the different subjects. Altogether, we have in the book an abridged history of science, and even of philosophy, the main subjects of which are also incidentally touched upon. Since the work presumes no special scientific or mathematical knowledge, it may be used with profit by every student, no matter what his profession or sphere of activity, the material it offers being such as should be known by every educated member of society. Further, on all the subjects coming within the designation of the "propædeutics of physics and chemistry" it constitutes a valuable reference book of the facts, and more especially of the literature, as also an etymological dictionary of scientific terms. That many dubious philosophical considerations should have slipped into a work which covers so vast a field and sounds the depths of so many sciences is natural and intelligible. This we shall see in the following review of the contents:

We have in Chapter I. a discussion of the character of science and logic; in Chapter II. a discussion of the character, method, and aim of physical science; Chapter III. treats of the origin of physical and chemical science and of scientific observation; in Chapter IV. space and time are treated. Here the author takes the

position that the questions why space is three-dimensional and time is one-dimensional, are problems that lie totally without the bounds of human comprehension. Even his own views on the subject are not confidently pronounced, for who, he says, would dare to assert he had found the solution of questions thus hovering at the boundary-line of human thought.

In Chapter V. we have a brief note on causality. In Chapters VI., VII., and VIII. we have a good presentation of the principles of mensuration and of metrical systems, of the graphic representation of natural phenomena. and of the measurement of space and time, all of which is accompanied by appropriate descriptions and illustrations of instruments and methods. One of the most important chapters is that on matter, energy, work, and force, into which considerable metaphysical speculation has been introduced. 'Apart from mind,' the author asserts, 'we 'find but one thing possessing real and absolute existence in the world, and this 'one thing we call substance. Substance comprises matter and energy, and when 'we speak of matter and energy we must be understood as making the tacit as-'sumption that both are simply integral parts of one and the same substance.'

We catch at once the author's metaphysical point of view. He says further: 'That which science calls matter is identical with but one of the component parts 'of the substance present in the physical cosmos. Further, it is practically impos-'sible to conceive of dynamic effects as not proceeding from some vehicle. Conse-'quently energy, as the component part of a substance, must itself be substantial, 'has the same right to be considered such as matter. Energy is not an independent 'substance, but, combined with and supplementing matter, it forms, together with 'the latter, the ultimate uncreatable and indestructible substance that constitutes 'the physical All.'

Heat, light, and electricity are sub-species of energy, and the author finds no philosophical impediment in saying that energy *possesses* a capacity to perform work. The development of the theory of energy has been made the basis of this work, and the philosophical interpretation of its significance is a point upon which the author apparently lays great stress. We have only to add that so deeply has the power of the chemical and molecular theories of physics impressed his mind that he actually proposes a molecular hypothesis of energy. Even Professor Ostwald, who has approached this conception very nearly, writes in a private letter to Dr. Griesbach that he sees at present no occasion for a molecular hypothesis of energy. It is certainly difficult to see what satisfaction the solution of a problem can give which simply refers its difficulties farther and farther back and associates them with less palpable and more tenuous particles. If such theories can satisfy the mind in the long run, it will not be long before we shall be conceiving of motion as a substance.

Chapter XI. treats of the measurement of velocity; Chapters XII. and XIII. of centrifugal forces and their practical applications, of friction and obstacles to motion; Chapters XIV., XV., XVI., and XVII. treat of the divisibility and constitu-

tion of ponderable matter, of the important question of the constitution of the ether, of the history of atomistic theories and of organic and inorganic matter. In the following chapters, so far as the second installment, we have discussions of the porosity of matter, with demonstrations and suggestions of its significance in applied science. Atmospheric pressure is treated, barometers, and manometers fully described, and finally, there is a long and important chapter on aggregate states of matter. The biological and physiological chapters in the first two installments contain a wealth of material, brought down to date. The pathogenic properties of organised matter are treated of here, the conditions of fermentation and of the production of disease by bacteria, with good studies of typical forms of micro-organisms. The bibliography is particularly full and valuable.

The third installment, which has not yet reached our hands, will deal mainly with the science of energetics, including heat, gravitation, radiant and chemical energy, discussing the sources of energy, its laws, the foundations of modern chemistry, and not omitting other branches of physics which are of importance in the propædeutical studies which the author has in view. *μκρκ.*

ESSAIS SUR LA PHILOSOPHIE DES SCIENCES. Analyse.—Mécanique. Par C. De Freycinet. Paris: Gauthier-Villars et fils. 1896. Pages, 336.

M. Freycinet seeks to answer such questions as, What is the exact nature of the notions of infinity and infinitesimal quantities whereon the higher analysis rests? Wherein does the "invention of Leibnitz" differ from the common algebra? What share of the contents of mechanical principles is to be assigned to reasoning and what to experience? What assures the conservation of force and energy? May we predict a gradual slackening of the causes that agitate matter? And so forth.

The notions of Analysis, M. Freycinet contends, are derived directly from the notions of space and time, which for him are necessary, infinite, continuous, and homogeneous. His speculations on this topic are essentially based upon the reflexions of Pascal who, he says, would certainly have invented the Differential Calculus had he not been early called away from science by his excessive religiosity. Infinity is immanent in nature and inherent in mind, escaping intimate comprehension, yet serving accurately our purposes,—a necessary attribute of the world of sense and intellect: and hence its power. The parallelism of mind and nature, in fact, runs all through M. Freycinet's book, and furnishes him with a satisfactory key to many metaphysical problems. So here, after an examination of the Calculus and of its applicability to Physics, he finds "that the Infinitesimal Analysis is alike admirably adapted to the phenomena of nature and to the conceptions of human reason,—apparently forming a bond of union between the intellect and the outer world, which is the highest commendation one can bestow upon it." And the same consideration is applied to the notions of Mechanics, where it is said that "the human mind and nature form integral parts of the same system, by virtue of which the one is richly equipped for the comprehension of the other;" and he illustrates his idea by the example of the Apollonian discovery of conic sections, centuries before their employment as a model of the planetary system. Generally Mr. Freycinet's reflexions upon the subject of limits and the infinitesimal method are lucid and unobjectionable, and from their simplicity may be re-

commended to elementary students. He finds the two ideas of limits and infinitesimals to be conjoint, correlative notions, not at all illogical, and sees the difference of common algebra and the infinitesimal method in the sameness, the simple more-or-less-ness, of the quantities dealt with by the former, and the non-identity, not excluding a sort of homogeneity, of the variables and limits of the latter.

In the chapters on Mechanics, we have numerous elucidative discussions, at times not unmixed with metaphysics. On the ground that the slightest impulse can impart motion to the largest mass, we are led to the statement that "resistance is never *in* the body but always *without* the body,"—a proposition full of light and truth, but entirely depending on the definition of "resistançe," and when true only equivalent to its premise. After an examination of the circle-argument involved in the description of mass in terms of quantity of matter, mass is defined as "the expression of relative mobility."

One ingenious point is the enunciation of the idea of *dynamic capacity*,—an analogue of calorific capacity, or of the idea of specific heat. We may say, according to the author, that the same volumes of water, lead, mercury, etc., *absorb* different quantities of force or "impulsion," just as they do different quantities of heat. And as we construct scales of specific heats, so we could construct dynamic scales of bodies, which would give what is commonly called their "quantity of matter" or mass. We see here the form Physics might have taken on, had it been possible to start from heat instead of motions of masses. The idea, at least in its order, is not new.[1]

M. Freycinet insists clearly and repeatedly on the separation of experience from reason in the contents of Mechanics, and also on many other sound fundamental doctrines. We have not time to enter into the physical metaphysics of the latter chapters of M. Freycinet's book; we wish merely to indicate the scope and general aim of the work. M. Freycinet is a distinguished French engineer, a member of the National Institute, and already well known as a writer upon the philosophical aspects of scientific questions. He has always applied himself by predilection to the questions involved in the epistemological foundations of the Calculus and mechanics, and his present work is a continuation of former investigations in this domain. One is constrained to admire the conciseness and directness of his expositions, as also the apt and simple style in which they are conveyed. Altogether we have a very readable book, combining commendable internal and external excellences.

T. J. McC.

N. B.—Reviews of works by Dr. Jodl, Dr. Eucken, Dr. Mach, Dr. Ratto, and others have been crowded out of the present *Monist*, as have also the "Contents of Periodicals."

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[1] See Mach, *Ueber die Erhaltung der Arbeit*, Prague, 1872; *Popular Scientific Lectures*, Chicago, 1894, pp. 168-171.

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THE MONIST.

HEGEL TO-DAY.[1]

I.

PHILOSOPHICAL SYSTEMS have their ups and downs in the world as well as books. And in no instance is this shown with greater clearness than by the place which Hegel occupies to-day in philosophy. After having first enravished the intellect of Germany and profoundly contributed to the moulding of her institutions, he was subsequently so far dislodged from his commanding position as to be almost entirely forgotten by the present generation. Undoubtedly his personality still persists in us as thoughts, ideals, and even as words, but his system as a whole now finds but few isolated votaries, and it is not uncommon to find persons who deem it an unfailing mark of scientific acumen to disparage Hegel and to treat him as a pretender in the realm of speculation.

Utterly different is the situation in America and England. Here we see Hegel constantly gaining new friends and constantly extending his influence. More and more his system is becoming the rallying-point of all who stand in need of a comprehensive scheme for combating scepticism, dualism, and utilitarianism; and to many he seems to offer a durable foundation not only for philosophy, but also for the practical conduct of life.

The wide gulf which separates opinion of the philosopher at home and appreciation of him abroad affords tempting material for

[1] Translated from Professor Eucken's manuscript by Thomas J. McCormack.

discussion. But to treat it we must first sketch as tersely and lucidly as possible the leading characteristics of Hegel's philosophy as well as glance at the historical conditions out of which it grew.

Two great intellectual currents are merged in Hegel's system. The first is the philosophy of the great German classical writers, developed in opposition to the rationalistic movement of the eighteenth century, rising in Herder and culminating in Goethe. This philosophy opposed with might and main the exclusive hegemony of the intellect, of ratiocination, of reflexion pure and simple; it sought a more primordial source, a more promising outlook for life. It was not content to interpret the world solely from the point of view of man and to shape it with reference to his special ends, but the things of the world were invested with appropriate potentialities of their own, and reality was conceived as embracing far more comprehensive and purer forms of life than those appurtenant to man individually. Nature and history thus took on a profundity and vitality with which they were never endued before, and to man himself, as the outcome of his widened relations, was opened up a far fuller life and far deeper vistas into the truth than had ever before been held out to him.

The second current of influences which moulded the intellectuality of the thinkers of the nineteenth century proceeded from Kant. In the philosophy of Kant the thinking subject was severed from all outward connexions, and installed in a position of absolute independence as regards the world. Reality was degraded to a realm of purely phenomenal appearances, while the sphere of objectivity, the sovereign domain of the thing-in-itself, seemed utterly and hopelessly beyond man's reach. At first blush, the tenets of the critical philosophy appear to be in violent contrast with the views of the great poets. But closer examination discloses bonds of union. The poets were quite averse to the notion of a completed world; they expressly reserved to their imagination, to their artistic creative faculty the function of imparting new life and higher value to reality. On the other hand, by the "subject" which gives shape and being to the empirical world, Kant does not mean the individual as such, so much as the intellectual organisation of in-

dividuals. His discovery—the point he developed—related to the inward constitution of the mind; in his *Practical Reason* he even created, entirely from within, a realm of absolute reason.

The combining of two movements having such affinities was therefore a perfectly natural step. The world wherein all contrarieties were reconciled, and for which all men longed, was discovered in the human mind itself. Inwardness was made synonymous with universe.

The effort thus briefly sketched constituted the pith and kernel of all speculative philosophy from Fichte to Hegel; the individual bent of each thinker being expressed by the particular operation which he selected as the embodiment of the world and in which he sought the creative action of the mind. Fichte found its typification in ethics, which afterwards assumed with him a religious coloring; Schelling found it in the various leading phases of his individual life, in his physico-philosophical, æsthetical, and religio-historical speculations; Hegel, finally, discovers its embodiment in logic, which grows with him to proportions of omnipotence, dominating the whole cosmos and all history. With logic the movement first assumes its fullest universality, first actually begins to push the entering wedge into the entire broad fabric of reality. And here, therefore, the culminating point unquestionably is reached, and we have only to see the form which Hegel's philosophy assumes, as reared upon these foundations.

II.

Hegel cannot make thought the essence and kernel of reality without lifting it far above immediate subjective reflexion. He does so by rejecting the opinings and longings of individuals as absolutely outside the pale of science; the upshot being that we are obliged to divorce our personal crochets and predilections altogether from research and to consider solely the gist of the matter, as that is shaped by immanent necessity. If this be done, our thought is not something special and isolated, having an allotted place by the side of other sorts of thought, but it is thought itself, pure and simple, and bearing within itself the assurance of abso-

lute truth. Without such certainty, there can exist, according to Hegel, no impulse to philosophical work. In diametrical contrast to those who cannot restrict the barriers of human knowledge sharply enough, he says: "The courage of truth, faith in the pow-"ers of the mind is the first condition of philosophical research. "Man must honor himself and esteem himself worthy of the high-"est there is. He cannot rate the greatness and potency of mind "too high. The locked heart of the universe has no power that "can withstand the courageous assaults of the intellect; it must "open its doors to it, and lay its riches and depths before its eyes "and render them subservient to its pleasure."

Further, the thought which in Hegel's conception produces reality, is not a quiescent, completed existence, but a living spring whose waters incessantly gush forth and are constantly spreading. It constitutes a process impelled by its own forces and governed by its own laws. One simple fundamental principle appears to be at the bottom of all its varied intricacy: the law of movement by contrariety. From every thesis springs an antithesis, and the two together strive for synthesis. This latter forms a new starting-point and produces new antitheses and syntheses, and so the process goes on until finally all reality is caught in the movement.

More closely considered, this liquefaction of reality signifies that all concepts involve contradictions which come to light in movement, which dissolve the original concept and afterwards engender new concepts. In Hegel's view "all things are self-contradictory," and there exists "in every actuality a combination of existence and non-existence." By the agency of the negative the concept is enabled to pursue naturally its further development. The method becomes a genuine dialectic and appears in no respect a procedure forcibly impressed upon things by man, but as something spontaneously proceeding from the things themselves, or as "the natural and spontaneous movement of the concept." As this movement is developed, and forges onward according to the rhythmic law of negative and positive, gradually everything foreign and extrinsic is subdued, all darkness is transformed into light, and all death into life. Ultimately the mind will know all things as its own

and therewith reach the culminating acme of clear self-consciousness. "The true is the whole. But the whole is only that which is reaching perfection through its own spontaneous development."

In this movement every stage is a transitional point only. Nothing that is individual can detach and establish itself without soon becoming a prey to lethargy and error. In the very moment at which a thing reaches its perfection, and so has fulfilled its purpose, begins its decline. Thus, life becomes an incessant struggling. But struggle is not absolute decay, outward disappearance is not complete extinction. Everything that sacrifices its individual existence is preserved as an integral part, a "moment" of the higher stage. Individual natures succumb in the rushing life-flood of this prodigious process, only to find a new and imperishable existence in the bosom of the whole. Thus the victory always remains with life, but the annihilation which victory incessantly demands is in its results appallingly tragical.

The rigorous application of this method engenders a thoroughly characteristic picture of reality. Not only is everything involved in flux, but all things are reciprocally concatenated, and everything individual and isolated acquires its just import and valuation only through its relations and connexions. Everywhere the condition of progress is conflict and struggle, never silent and peaceful growth. Life is here summoned to put forth its highest efforts and activities. Whatever seemed outward and partaking of the senses is now proved to be a mere phenomenon *of* mind *for* mind; nevermore can material ends be made the goal of conduct. Intellectual effort is thrown wholly upon its own resources and lifted utterly beyond the interests of the individual man and immediate psychical life; it is the action of a higher power, of purely intellectual and divine creating, that man experiences and feels in his individual life. But everything intellectual is concentrated in thought with its concepts. Therefore the problem is always to array the world's complexes under some broad, comprehending concept, to illuminate the whole domain with some *one* light-giving idea. These Ideas form the gist and motive power of history. It is true the work is distributed into many provinces, but they are all har-

moniously adjusted to one grand, comprehensive connexion, and appear as phases or stages of one truth. Thus all things are compressed and riveted together in a colossal intellectualisation of matter, the whole broad scope of life is cast in one mould. But over all the rushing haste of movement soars an all-comprehensive contemplation, and so the multitudinous press of existence is transformed into the quiescent calmness of a life under the form of eternity—*sub specie æternitatis.*

This process, in the first instance, is a matter of *intellectual* power, not of a *moral* frame of mind. But the moral element is far from lacking in it, being involved in absolute abandonment to the movement of the world-process, in the subjection of all subjective desire to the compulsion of objective truth. The Ideas make use of man even against his desire and knowledge; he is constrained to serve them as their instrument, even where he is pursuing his own ends and is desirous of satisfying only his own passions. "Passions mutually annihilate one another; reason alone is stirring, pursuing its own ends and asserting its own prerogatives." Making the Ideas one's personal will, *that* is morality; and "the great men of history are they who make their individual ends the substantial incarnation of what is the will of the world-mind."

The elaboration of this fundamental conception is not attended in all departments with equal facility. Nature remains a badly treated step-child, and also with the psychical life of the individual Hegel is able to accomplish little. His strength lies indisputably on the historical and sociological side, and there is nothing more characteristic of his thought than his close interweaving of the logical process with a comprehensive historical consideration of things.

The distinctest unfoldment of the view and method mentioned is to be found in his theory of the state. As an aggregate fabric of reason, as "the realising of the moral idea," the state stands high above individuals; it is not instituted to subserve their ends, but to unfold its own Idea as its highest self-constituted aim. The superiority of the whole to individuals does not prevent the holding of great individuals in high esteem. Hegel is thoroughly saturated

with the view that all great achievements in history and society are the performance of a few gifted individuals, and not the work of the striving masses. Yet these individuals are not isolated phenomena, they are engendered by their time and simply give clear expression to the obscure but irresistible endeavors of the community at large. In public opinion there are all things, both false and true. To find what is true is the office of the great man. He who gives this to his time who fulfils what it wants and struggles to express, is the great man of his time.

At the same time Hegel stoutly combats the wide-spread tendency to apply purely subjective criticism to the state and to dwell exclusively on the evils which under human conditions inevitably cling to it. On the contrary, we should, he holds, transport ourselves into the innermost life and heart of the whole and seek from this point of view to comprehend its many isolated expressions. As philosophical insight generally leads to reconciliation with reality, so, too, it must apprehend and represent the state as something consistently rational. And here the problem of all problems is to apprehend the rational as real and the real as rational. For it is as much the purpose of philosophical thought to engender the world as to understand it. A philosophy is nothing more than "its age comprehended in thought," and so it constitutes not the beginning but the conclusion of an epoch of civilisation. "As the thought of the world, it appears only after reality has completed and perfected its formational process. The owl of Minerva begins her flight only on the falling of the evening twilight."

Hegel, accordingly, taught the world to think more highly of the state, as also to commit to it greater and more arduous duties. Further, he applied his philosophical ideas with pertinacious insistence to the minuter structure of political relations. Everywhere in human society he discovers movement by thesis and antithesis towards synthesis, everywhere the operation of contradiction. So here the culmination of substantial, practical morality, whose expression the state is, is first reached through the stages of outward law and subjective morality. Thus Hegel understands punishment as the negation of the criminal's negation of the jural order. Thus

he recognises in love a resignation of individual existence and a regaining of new existence in the object of the love. So likewise, in violation of the general tendency of philosophy, he defended war as an indispensable instrument of the moral health of nations.

But the single state is not in Hegel's conception the conclusion of things; its ultimate mission is to be discharged into the ocean of the world's historical process. Some one people is always the chief vehicle of the growth of its time. Every civilised nation has its day. But it holds its vantage only for a brief time and then must deliver its torch to another. All the achievements of single nations and times serve but a single great purpose,—the development of mind to the consciousness of its freedom. In all building up and tearing down but one thing is fulfilled,—the self-discovery, the self-reversion of mind. To obtain this substantial freedom requires such great labor, for the reason that the mind is constantly reconcealing its own concept, and so is being constantly estranged from itself. Thus, "evolution which in nature is a silent outgrowth, in mind is a severe and unceasing struggle against self."

The manner in which the several epochs of civilisation compose chapters and stages of this universal historical movement has been set forth by Hegel with great power, but also with not a little violence, and has been brought down by him to the present time, in which he believes the victorious conclusion of the whole process is reached, the full self-consciousness of the mind attained. He closes with the joyous conviction: "The development of the principle of mind is the true theodicy, for it is the apprehension that the mind can free itself only in the element of mind, and that that which has come to pass and is coming to pass day in and day out, not only comes from God but is God's work itself."

The acme of intellectual life is found by Hegel in the realm of absolute mind, which he divides into the provinces of art, religion, and philosophy. The content of one and all is the same truth: the mind's discovery and possessing of itself through movement. Art shows this truth in the form of sensuous intuition, religion in the form of representation, philosophy in the form of the pure concept. Everywhere the intellectual content is paramount. In art the first

thing to be sought is the leading Idea, and the history of art thus becomes a reflex of the intellectual movement. In religion the element of obscure feeling is emphatically rejected; the core is the thought; only when the thought is true is the feeling, too, of the right sort.

Here, accordingly, as there, the whole is peculiarly shaped by considerations of universal history, in which Hegel regards his own time as the acme and confluence of the grand world-movement as it progresses by contradiction. Hegel is enabled to give religion a characteristic content by the idea which penetrates his entire system, of the absorption of the individual in the intellectual process at large and of the new formation of man proceeding therefrom. He knows how to portray the life and operation of religion in powerful language. "In this region of the mind flow the Lethean floods in which Psyche quenches her burning thirst, in which she drowns her every sorrow, shapes the rough asperities and darkened sides of time to a mirrored dream, and transfigures them to the bright radiance of eternity." And religion withal is not a power from beyond, but a power here present with us and saturating all reality. "The reason of man, the consciousness of his being, is reason pure and simple; the divine in man and the mind, in so far as it is the mind of God, is not a mind beyond the stars, beyond the world, but God is present, everywhere present, and present as mind in all minds." Thus he hopes and speaks with primordial force. But whether this religion of the absolute intellectual process is identical with the Christian religion as Hegel asserts it is, is quite another question.

The highest summit is occupied by pure philosophy, the philosophy of knowledge as "mind knowing itself in the form of mind, or as comprehending-knowledge." Pure philosophy is not something distinct from its history, but the movement of its history itself, its movement comprehended in unity and illuminated by thought. The doctrines of single philosophers are not the views and notions of mere individuals, but stages of one grand, continuous intellectual process. Everything here has its assured place, everything arises out of the whole and flows back again into the

whole. In the case of individual thinkers, their doctrines all conform to a single leading Idea, and only by such conformity can they attain their fullest value. The march of this movement is again subject to the law of contradiction, of upward movement by thesis and antithesis; here also struggle is the father of things. But the present forms the perfected and highest stage, considered from which all that has gone before is set in its proper light, and every isolated existence put in possession of its rights. The whole now appears "as a circle which returns into itself," which presupposes its beginning and reaches it only at the end." Thus only can the restless haste of its advance be transformed into the serenity and bliss of all-comprehensive contemplation.

III.

It needs but little study of Hegel's system to understand not only its powerful influence upon its time, but also its irresistible present attraction for sympathetic minds. The idea of a system unlimited in comprehension and shaping all departments of thought and life by the action of the same set of fundamental principles, operates in his philosophy with gigantic power; while its excessive condensation is exhibited by scarcely any other system. The kernel of Hegel's philosophy is extremely simple, yet the outgrowth from it is nowise lacking in luxuriance and variety. With all the rigor to which its elaboration as an entirety is subjected, every department yet seems to disclose its distinctive characteristics with perfect freedom and facility. A further striking feature is the idea of a universal reason, of a substantial truth absolutely independent of the opinions and volitions of the subject—a truth which proceeds in its development by dint of its own intrinsic necessity and according to its own intrinsic laws, and which lifts the mortals who obey it far above the pettiness of every-day life. Extremely fruitful, too, is the idea of an incessant onward movement of life, of the fluidity of all individual entities, and of their being conditioned by the flow of the whole. But most titanic of all, perhaps, is the doctrine, which no other thinker has advocated with the same vigor, that there can be no genuine progress without contradiction and strug-

gle, that negation is not obstruction, but rather an indispensable means of deepening life and of enhancing its process, that without the perturbing, goading power of contradiction life would lose its sap and sinews.[1] Nor is this a mere accompaniment, a sickly pallor cast upon scientific work, but a power permeating it to its very foundations and bestowing upon it sharply defined characteristics. On the other hand, amid all its abstractness, Hegel's views are not infrequently conveyed by means of glowing portrayals and fervent appeals to the senses. And so we opine that no one who will impartially and thoroughly surrender himself to the powerful influences of Hegel's system as a whole can possibly gainsay to him the title of a great and genuine philosopher. Nowhere is the dominant bent of our century for history and sociology so distinctly placed at the summit of philosophical thought as in the philosophy of Hegel.

But this does not signify that we are obliged to accept Hegel as our chief guide in modern philosophical investigation or that we can or should accept as definitive his work. Rigorous, unhampered criticism is nowise incompatible with recognition of transcendent intellectual power. Such criticism, however, should not carp from without at the results of the system before it, but should place itself at its centre and there put to the test its tenability as a whole. In this undertaking the important question arises whether the reality present to the philosopher's mind is mastered by his thought, whether the *intuition* and the *system* of the man are combined and form an inward unity. To this question we must emphatically answer no. With Hegel intuition is not merely the elaborating and visualising, the practical applying of the system, but it is characterised by a different and far richer and more substantial fundamental conception. The system, rigorously conceived, is panlogism—and panlogism not only in the sense of its seeking a thoroughgoing, logical concatenation of things, but panlogism in the absolute sense of asserting that thought alone, wholly by itself, and as the upshot of its own independent developmental movement, is the creator of all

[1] Compare on this point P. Carus on "The Problem of Good and Evil," in the July, 1896, number of *The Monist*, and the same writer's *Primer of Philosophy*, p 100 et seq.

existence. Reality here is nothing but the intellectual process, nothing but thought proceeding from itself and reverting into itself. "All the choir of heaven and the furniture of earth" is transmuted into a prodigious web of logical relations. Such self-sufficient thought can tolerate nothing beside itself. It must annihilate, perforce, all immediate intuition and feeling, all psychical inwardness, all ethical valuation; must destroy all the contents of life. Man is here converted outright into a mere tool of the logical process, and logically he should utterly dissolve therein, never again attaining living experience or command of the process through the agency of personality, and therefore never again being able to convert it into personal conviction and sentiment. Thus all human doing, all varied human movement in life would remain at bottom cold and empty; the soul would be wrested from the bosom of reality.

This tendency is unquestionably a marked feature of Hegel, but it is not all of Hegel. It is incessantly counteracted by the luxuriant intuition of a personality that belonged to a great epoch and had made his own the total fruits of the world's historical experience. Thus his convictions acquire enthusiasm from Christianity, which in his early theological studies at Tübingen had grown so familiar to him; so the riches of the whole golden age of German literature found embodiment in his philosophy of art; and so his political views were fructified by the conception of the modern civilised state. His profound grasp of the forces and causes acting at the foundation of history and society is the very feature, in fact, that distinguishes Hegel. Wherever a living visual grasp of reality is associated with intellectual creation, there Hegel's achievements have been great and have always borne fruit. On the other hand, even where such connexion has been established, we cannot deceive ourselves as to the fact that perfect inward unity does not exist. The contents of the system point beyond panlogism, yet without ever reaching, as contrasted therewith, their full development.

Particularly striking, again, is the limitation of Hegel's thought at points where his work seeks no connexion with intuition, as is the case in many branches of logic and psychology, and more espe-

cially so in the case of nature. For in these instances, where the method of construction by concepts is thrown entirely upon its own resources, Hegel often becomes formal, empty, and unendurable. His thoroughgoing contempt for experience is here mercilessly avenged. And if, despite its crushing failure in this regard, the presumption of the system, as being the end-all and be-all of research, is still doggedly persisted in, the violent opposition it has encountered is readily intelligible. It is now also luminously apparent how little the lever of pure cenceptual effort can accomplish when it has no hold on substance, but hovers in the empty air.

The logical process proving powerless to comprehend the whole wealth of reality, and intuition and system having parted company, a second cardinal misgiving is produced by the attempt to convert all reality into a restlessly onward surging process, and at the same time to survey this process as a whole, to interpret it and make it part of our personal experience. That a contradiction inheres in this attempt is shown with special distinctness in Hegel's attitude towards history. Hegel demands here both a final conclusion and unceasing striving onwards. The immeasurability of the intellectual process is absolutely contradictory to cessation at a fixed point of time; the movement must continue forever. An unbounded future lies before us; the present is merely a link in an endless chain. In the logical elaboration of this idea every single age would be a transitional point only, and all valuation relative. By the law of contradiction, all truths and estimates of the present must perforce be reversed into their opposites. But Hegel will not dream of admitting these inevitable conclusions; if he accepted them, he would sacrifice the very essence of his system and give up all claim to speculative philosophy. The latter exactingly demands a survey of the movement as a whole, which would require withdrawal from the realm of becoming into that of a persisting existence, a removal into a kingdom of eternal truth. Were Hegel to give up such an ultimate conclusion and contemplation from the point of view of the whole, his philosophy would sink to a mere passing glimpse of a fleeting epoch of time and offer only an instantaneous photograph of reality.

There are asserted here, accordingly, two diametrically opposite tendencies, which stand unreconciled by the side of each other. On the one hand, we have a stabilism, which regards the developmental course of the world as terminated, which is turned irrevocably to the past and has not the slightest interest in the future; on the other hand, we have a radicalism which promises a constant renewal of life and holds out the constant possibility of catastrophes. In the mind of the master the conservative tendency prevailed, which resulted in a serene contemplation of things. With the disciples the radical tendency got the upper hand, and so Hegelianism became the main bulwark of the revolutionary movement of our century, and as such it is preserved to-day in social democracy, particularly in Germany.

IV.

The foregoing contradictions explain fully the different attitudes which men take towards Hegel, and the alternate attraction and repulsion which he exerts upon different minds. In its mother country the destiny of the system was determined by the fact that the final shaping of Hegel's philosophy coincided with a great crisis in the nation's life,—a crisis in which speculative and artistic pursuits were abandoned and men's energies turned to the solution of scientific and political problems, in which the philosophy of idealism was abandoned for that of realism. Previously to Hegel in Germany the interest of thinkers was dominated by questions relating to spiritual and mental culture. The worth and greatness of a man was measured solely by his participation in intellectual work. Instead of this, from about 1830 on, man as he actually exists, man as he is in flesh and blood, becomes more and more the ruling interest of life. The burning problems and tasks now spring from man's relations to his environment and to society; the world of speculation pales away, and is forced more and more into the background. Hegel's philosophy itself has been pressed into the service of this realistic movement, and at the same time forced, as above explained, into the relativistic and radical mould. Upon the whole, however, his philosophy has had to resign its primacy to the natu-

ral sciences. A scientific epoch begins its career of victory. And when philosophy actually did again secure an independent standing, it was the doctrine of Schopenhauer that first took possession of thinking minds.

And nothing is more characteristic of Schopenhauer's methods than their diametrical contrast to Hegel's philosophy. In Hegel we have the unfolding of the intellectual process with its endless concatenations; in Schopenhauer, abandonment to immediate feeling and intuition; in the former, intellectual life, powerful creating and shaping; in the latter, pure intuiting, luxuriant sentiment, and suffering; there, a pressing of all experience into the service of the positive and rational; here, an equally vigorous use of it in the service of the negative and irrational. Only very gradually was anything like an equilibrium of philosophical judgment restored in Germany, leading to Hegel's reinstatement in his rights and fame. But to readopt him outright was and is absolutely impossible, owing to the great inward revolutions and crises that have come upon the nation.

Quite different is the situation in English-speaking countries. The particular relations and complications of the German environment are lacking here. In these countries one can absorb and digest Hegel without misgivings. Under these circumstances it is quite intelligible that he should exert a powerful attraction. A newly aspiring intellectual life is strongly fascinated by the spirit which here operates, and is the more attracted to it by the fact that it finds in it a potent offset to many superficial and unproductive tendencies of the day. As contrasted with the distraction of modern life, one finds here unity and coherency, uniformity in all departments; as contrasted with the many varied sorts of dualism, one finds a robust monism; as contrasted with the languor of mysticism and pessimism, a joyful faith in the potency of reason, in reality, and in our ability to force our way through to it. Whereas now reflexion, self-contemplation, and subjective vanity are so prevalent, in Hegel everything personal and relating to self vanishes before the seriousness of labor. Finally, the transforming of life into thought and work is valiantly opposed to all kinds of utilitarianism. It is

thus the yearning for a deepening of life, for a more substantial content of thought which drives people to Hegel. In this sense we may salute Hegelianism in America with sympathy, and wish for it a constantly growing diffusion.

But it also appears here in its narrower conception, and with even more dogmatic assertion, and this excites criticism and opposition. Hegel's system is not infrequently treated as definitively conclusive. All the intellectual and ethical needs of man are ostensibly satisfied by it, and even to-day it is still supposed to dominate the movement of thought. All that is great and good in history is believed to be scientifically comprehended and condensed in Hegel. It is also asserted to be in full harmony with Christianity, as was recently asserted in an article in *The Monist*. If we accept the analysis given in the present article, we must not only look upon this as incorrect, but must say that it betrays an inaccurate conception of the great thinker. Hegel is in the first instance the philosopher of the absolute intellectual process. Even that in his philosophy which is not absorbed in this intellectual process receives from it a characteristic coloring. Contradiction must arise where men see more in reality than the incessant movement of unhampered thought, which derives its motive powers wholly from its own resources. What was said regarding the cleft between intuition and system and regarding the contradiction in the concept of the absolute process, applies to all the regenerated forms of Hegelianism. The multitudinous experiences which humanity has gained in science and life since the heyday of Hegel's philosophy, only render it more impossible for modern thought to readopt it in a modified form. Hegel's system is pure philosophical spiritualism. It can never allow independence or significance to sensuous existence; Hegel holds that "Nature is the theatre of infinite mind: nature exists only for man."

With such convictions his glance is absolutely restricted to terrestrial nature. The remaining celestial bodies seem hardly to exist for him. Here on earth reality seems to live out its existential rôle. All this is quite in harmony with an age which was so absolutely taken up with the life and creations of man that nature

filled merely the part of a background to the play. But how can such a conception be adhered to to-day, when nature has acquired so infinitely much more significance for us and life has been utterly transformed by our having revealed her laws and exploited her powers? Further, filled with his artistic conception of nature, Hegel looks upon the formation of natural life as a quiet, peaceful development; he makes organic creatures evolve from the bosom of nature as the bud from the blossom. Does not our having learned the import of the struggle for existence necessarily change the whole face of our world-conception? Finally, we stand in the midst of tremendous social complications, and daily have palpable proof of the prodigious potency of the outward conditions of life. With Hegel, on the contrary, the life and development of human beings is entirely dominated by spiritual, and pre-eminently by intellectual, factors.

And still another scruple is raised by panlogism of the Hegelian stripe, with its transforming of all reality into the movement of absolute thought. In the first place, to-day we have too modest an opinion of human powers to identify our thought thus quickly and lightly with absolute thought. We know that even under the most favorable circumstances and only by dint of hard labor and slow methods we can lift ourselves to the point where our thought is dominated by the unerring compulsion of truth. And again it is impossible for us to set ourselves so flippantly and rashly above the authority of experience as Hegel did, or, rather, fancied he did. For in truth Hegel himself incessantly drew from experience, and his system took on living form only through the assistance offered by this factor. How empty and hollow his performances are when his supposed absolute thought is drawing wholly from its own resources may be abundantly seen.

But the chief objection to Hegel springs from the circumstance that mind or spirit is more than intellect, and spiritual life broader than thought. In identifying spirituality with bare intellectuality, its full scope is not asserted. Inwardness, pure and simple, of psychic life, is suppressed. The intellectual powers violently displace the moral elements. The ideal in humanity is, with Hegel, not

free personality, but the spiritual, and, notably, the intellectually productive man; not the moral character in the sense of Kant, but the genius in the sense of an artistic, romantic world-view. We see that Hegel's system is not without its ethical element, yet this element is a mere appendage of intellectual activity, not the germ of a new and higher life. So, too, Hegel's religious teachings, when closely examined, are quite different from the conception of religion advanced by the great creeds of the world, and particularly by Christianity. The gist of religion is with him nothing but the absorption of the individual in the universal intellectual process. How such a conception can be identified with moral regeneration of the Christian stripe, with purification of the heart, is unintelligible to us. With Hegel, religion is at bottom but one, and that a lower, species of philosophy (the grasping of truth in the form of representation), and it is hard for it to assert by the side of philosophy anything like independence. Again, Hegel's religion is fundamentally different from the Christian as well as the Buddhistic, by the fact that it disposes of the problem of suffering in life in a manner altogether different from those religions. For just as his system of the absolute intellectual process, by positing a formal reason, a conformity to law, and a progressive movement in the All, totally converts reality into reason, so also it cherishes the belief that it has cleared up by the world's movement itself everything that is dark, and to have completely overcome all suffering. On the other hand, the bent of the system is here thoroughly optimistic and rationalistic. Participation in the civilising process appears to lift man above all cares and pains and appears to give to his life perfect and full contentment. But what necessity exists then to take refuge in religion at all, or to demand the opening up of a new world such as humanity heretofore has always expected of religion?

In short, in order to understand Hegel accurately in all his characteristic phases, one must also formulate his limitations, one must recognise the impossibility of going back unqualifiedly to his standpoint. In wishing, therefore, for a constantly increasing diffusion of the study of Hegel in America, we hope at the same time that the students of his philosophy will preserve their full inde-

pendence when under the master's sway, and not surrender themselves to blind subjection.

To adopt Hegel's system again to-day without qualifications, after so many tremendous revolutions in life, would be a thoroughly artificial restoration. And all such restorations, seeing that they subordinate their own time to one which is alien to it, are wont to be extremely unfruitful. Nor do they harmonise well with the deep-rooted conviction of thought, according to which all reality is an unceasing, onward-streaming of life. May the students of to-day, therefore, separate in Hegel the transitory from the intransitory, may they work out clearly and courageously those elements in his thought which are independent of his time and are calculated to further to-day the aspirations of high creative endeavor, and may they free themselves by searching criticism from everthing that was either at the beginning insufficient or has been proved by subsequent developments to be insufficient. It is the mark of all really great achievements and great men to be able to stand such winnowing, and, when everything has been rejected, to remain great still. And we believe that Hegel, too, can stand this test.

RUDOLPH EUCKEN.

JENA.

THE GENESIS OF SOCIAL "INTERESTS."

AS AN INTRODUCTION to what is to follow, I may be allowed to quote a passage from an earlier work[1] in which is given the theory of the rise of the notion of self, on which the point of the present slight paper rests.

"One of the most remarkable tendencies of the very young child in its responses to its environment is the tendency to recognise differences of personality. It responds to what I have called 'suggestions of personality.'. . . I think this distinction between persons and things, between agencies and objects, is the child's very first step toward a sense of the qualities which distinguish persons. The sense of uncertainty or lack of confidence grows stronger and stronger in its dealings with persons—an uncertainty contingent upon the moods, emotions, *nuances* of expression, and shades of treatment, of the persons around it. A person stands for a group of experiences quite unstable in its prophetic as it is in its historical meaning. This we may, for brevity of expression, assuming it to be first in order of development, call the '*projective* stage' in the growth of the personal consciousness, which is so important an element in social emotion.

"Further observation of children shows that the instrument of transition from such a 'projective' to a subjective sense of personality is the child's active bodily self, and the method of it is the principle of imitation. As a matter of fact, accommodation by actual muscular imitation does not arise in most children until about the seventh month, so utterly organic is the child before this, and so great is the impetus of its inherited instincts and tendencies. But when the organism is ripe, by reason of cerebral development, for the enlargement of its active range by new accommodations, then he begins to be dissatisfied with 'projects,' with contemplation, and so starts on his career of imitation. And of course he imitates persons. . . But it is only when a new kind of experience arises which we call effort—a set opposition to strain, stress, resistance, pain, an experience which arises, I think

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[1] *Mental Development in the Child and the Race: Methods and Processes* (Macmillan, 2d ed., 1895), pp. 335 ff.

first as imitative effort—that there comes that great line of cleavage in his experience which indicates the rise of volition, and which separates off the series now first really *subjective*. . . . The subject sense, then, is an actuating sense. What has formerly been 'projective' now becomes 'subjective.' The associates of other personal bodies, the attributes which made them different from things, are now attached to his own body with the further peculiarity of actuation. This we may call the *subjective* stage in the growth of the self-notion. . . . Again, it is easy to see what now happens. The child's subject sense goes out by a kind of return dialectic, which is really simply a second case of assimilation, to illuminate these other persons. The project of the earlier period is now lighted up, claimed, clothed on with the raiment of self-hood, by analogy with the subjective. The projective becomes *ejective*; that is, other people's bodies, says the child to himself, have experiences *in them* such as mine has. They are also *me's*: let them be assimilated to my *me* copy. This is the third stage; the *ejective*, or 'social' self, is born.

"The *ego* and the *alter* are thus born together. Both are crude and unreflective, largely organic, an aggregate of sensations, prime among which are efforts pushes, strains, physical pleasures and pains. And the two get purified and clarified together by this twofold reaction between project and subject, and between subject and eject. My sense of myself grows by imitation of you, and my sense of yourself grows in terms of my sense of myself. Both *ego* and *alter* are thus essentially social; each is a *socius*, and each is an imitative creation. So for a long time the child's sense of self includes too much. The circumference of the notion is too wide. It includes the infant's mother, and little brother, and nurse, in a literal sense; for they are what he thinks of and aims to act like by imitating, when he thinks of himself. To be separated from his mother is to lose a part of himself, as much so as to be separated from a hand or foot. And he is dependent for his growth directly upon these suggestions which come in for imitation from his personal *milieu*."

The outcome serves to afford a point of departure for the view which we may entertain of the person as he appears to himself in society. If it be true, as all the evidence goes to show, that what the person thinks of himself is a pole or terminus at one end of an opposition in the sense of personality generally, and that the other pole or terminus is the thought he has of the other person, the alter, then it is impossible to take his thought of himself at any time and say that in thinking of himself he is not essentially thinking of the alter also.[1] What he calls himself now is in large measure an in-

[1] In isolating the "thought elements" in the self, I do not, of course, deny the organic sensation and feeling elements; but, from the social point of view, the latter are unavailing.

corporation of elements that at an earlier period of his thought of personality, he called some one else. The acts now possible to himself, and so used by him to describe himself in thought to himself, were formerly only possible to the other; but by imitating that other he has brought them over to the opposite pole, and found them applicable with a richer meaning, and a modified value, as true predicates of himself also. If he thinks of himself in any particular past time, he can single out what was then he, as opposed to what has since become he; and the residue, the part of him that has since become he, that was then only thought of—if it was thought of as an attribute of personality at all—as attaching to some one whom he was acquainted with. For example, last year I thought of my friend W. as a man who had great skill on the bicycle and who wrote readily on the typewriter; my sense of his personality included these accomplishments, in what I have called a "projective" way. My sense of myself did not have these elements, except as my thought of my normal capacity to acquire delicate movements was comprehensive. But now, this year, I have learned to do both these things. I have taken the elements of W's personality formerly recognised, and by imitative learning, brought them over to myself. I now think of myself as one who rides a "wheel" and writes on a "machine." But I am able to think of myself thus only as my thought includes, in a way now called "subjective," the personal accomplishments of W., and with him of the more or less generalised alter which in this illustration we have taken him to stand for. So the truth we now learn is this: that each and all of the particular marks which I now call mine, when I think of myself, has had just this origin; I have first found it in my social environment, and by reason of my social and imitative disposition, have transferred it to myself by trying to act as if it were true of me, and so coming to find out that it is true of me. And further, all the things I hope to learn, to acquire, to become, all—if I think of them in a way to have any clear thought of my possible future—are now, before I acquire them, simply elements of my thought of others, of the social alter, or of what considered generally we may call the "socius."

But we should also note that what has been said of the one pole of this dialectical relation, the pole of self, is equally true of the other also—the pole represented by the other person, the alter. What do I have in mind when I think of him as a person? Evidently I must construe him, a person, in terms of what I think of myself, the only person whom I know in the intimate way we call "subjective." I cannot say that my thought of my friend W. is exhausted by the movements of wheel-riding or typewriting; nor of any collection of such acts, considered for themselves. Back of it all there is the attribution of the very fact of subjectivity which I have myself. And the subjectivity of him—it is just like that of me, to the degree to which I have any picture of it at all. I constantly enrich the actions which were at first his alone, and then became mine by imitation of him, with the meaning, the rich subjective value, the interpretation in terms of private ownership, which my appropriation of them in the first instance from him, has enabled me to make. So my thought of any other man—or all other men—is, to the richest degree, that which I understand of myself, together with the uncertainties of interpretation which my further knowledge of his acts enables me to conjecture. I think him rational, emotional, volitional, as I am; and the details of his more special characteristics, as far as I understand them at all, I weave out of possible actions of my own, when circumstances call me out in similar ways. But there is always the sense that there is more to understand about him; for as we have seen, he constantly, by the diversities between us which I do not yet comprehend, sets me new actions to imitate for my own growth.

So the dialectic may be read thus: my thought of self is in the main, as to its character as a personal self, filled up with my thought of others, distributed variously as individuals; and my thought of others, as persons, is mainly filled up with myself. In other words, but for certain minor distinctions in the filling, and for certain compelling distinctions between that which is immediate and that which is objective, the self and the alter are to our thought one and the same thing.

I do not care in this connexion to track out the distinction between the subjective or immediate, and the objective; nor to ask what it is that sets the bounds in fact to the person. What concerns us is independent of these inquiries, having to do with the question: What is in consciousness when one thinks of himself or of another person? This, it is evident, is a sufficient introduction to a number of questions of high social import; for we may ask: When a man asserts himself, what is it that he really asserts? When he sympathises with another, what exactly is that "other"? And how do all the emotions, and desires, and mental movements of whatever kind which pass through his consciousness involve others who are in social connexion with him? I claim, indeed, that it is just this kind of inquiries that most concern the social theorist just now, and with him the political thinker; and the vagueness and cross-firing which prevail in some of the discussions of these men are due in great part to inadequate understanding of the psychological concepts which they use.

To get such inquiries down to a psychological basis, the first requisite is to be reached in the concept of the person. Not the person as we look at him in action, alone, or chiefly; but the person as he thinks of himself. We constantly presume to tell him what his chief end is, what as an individual he most desires, what his selfish nature urges him to, and what self-sacrifices he is willing to make in this circumstance or that. We endeavor to reach a theory of "value" based on a calculus of the desire of one individual to gratify his individual wants, multiplied into the number of such individuals. Or we take a group of individuals together as we find them in society and ask how it is that these individuals could have come together. All this without so much as consulting the single person psychologically as to the view he has of his own social life, his opportunities, and his obligations! The average individual would be "scared" within an inch of his life if he were for a moment obliged to put up with the kind of existence which such theorists assume him to live; and he would be paralysed into permanent inertia if he had to effect by his conscious efforts what they teach us he works out. Even the later psychological sociologists, as notably M. Tarde,

treat "beliefs" and "desires" as ultimate self-existent things apart from the content of thought to which they are functionally attached.

To bring our development of the sense of personality, therefore, into view of these questions, let us attack one of the main points in the theory of society which recent discussion has tended to formulate. This point is that which concerns the "interests" of the individual. What are the interests of the individual, and how do they stand related to the interests of the community, state, social group, in which the individual lives?

Popularly, a man's interests are those aspects of possible fortune which are best for him. What is thus best for him is in the main what he wants; but the two classes are not always identical. Yet for the sake of making our point more secure in the sequel, suppose we begin by defining a man's interest as that which he wants, and is willing to put forth some endeavor to obtain. Then let us see how this tends to involve the man's self, and the selves of those who are associated with him.

If the analysis given above be true, then what a man thinks of as himself, is in large measure identical with what he thinks of as another, or the others in general. So the projection of the thought of "person," which, when looked at subjectively, he calls "my self," into an "other,"—this qualifies that other to be clothed on with all the further predicates found to attach to the self. The so-called love of self, it is evident, is such a predicate; it is a description of the attitude which the man takes to himself,—a kind of reaction of part of his nature upon another part. When he is proud, it is because the qualities by which he represents himself to himself are such that they arouse his approbation. When he thinks, therefore, of the other in terms of the same predicates, he has to react to a degree with the same sense of approval.

When, likewise, I go farther in thought and say that, being such and such a person, it is my interest to have such or such a fate, I must *perforce*—that is, by the very same mental movement which gives the outcome in my own case—attribute to him the same deserts and the same fate. Viewed psychologically, we should say that the predicate is a function of the content which we call self,

and that, so far as the content is the same, the predicate must be the same. But this sense of equal interest, desert, because of identical position in the evolution of selves, what is this but the sense of justice in the abstract, and in the concrete, the feeling of sympathy with the other? The very concept of interests, when one considers it with reference to himself, necessarily involves others, therefore, on very much the same footing as himself. His interests, the things he wants in life, are the things which, by the very same thought, he allows others, also, the right to want; and if he insists upon the gratification of his own wants at the expense of the legitimate wants of the "other," then he in so far does violence to his sympathies and to his sense of justice. And this in turn must impair his satisfaction. For the very gratification of himself thus secured must, if it be accompanied with any reflexion at all, involve the sense of the other's gratification also; and since this conflicts with the fact, a degree of discomfort must arise in mind varying with the development which the self has attained in the dialectical process which has been described.

Or suppose we look at the case a little differently. Let us say that the sense of self always involves the sense of the other. And this sense of the other is but that of another "self," where the word self is equivalent to myself, and the meaning of the word "other" is the only thing that prevents it from being myself. Now my point is that whatever I fancy, hope, fear, desire for self in general, with no qualification as to which self it is, remains the same whether afterwards I do qualify it by the word "my" or by the word "other." Psychologically there is a great mass of motor attitudes and reactive expressions which become conscious as emotion and desire, common to the self-thought everywhere.

This is true just in so far as there is a certain typical other self whose relation to me has been that of social give and take by which the whole development of a sense of self of any kind has been made possible. And we find certain distinctions at different stages of the development which serve to throw the general idea of the social relationship into clearer light.

Let us look at the life of the child with especial view to his at-

titudes to those around him; taking the most common case, that of a child in a family of children. We find that such a child shows, in the very first stages of his sense of himself as a being of rights, duties, etc., a very organic nature. He is occupied mainly with the business of learning about himself, other people, and nature. He imitates everything, being a veritable copying-machine. He spends the time not given to imitating others very largely in practising what he has picked up by his imitations, and in the exploiting of these accomplishments. His two dominating characteristics are a certain slavishness, on the one hand, in following all examples set around him; and then, on the other hand, a certain bold aggressiveness, inventiveness, a showing-off, in the use he makes of the things he learns.

But it does not take very extended observation to convince us that this difference in his attitudes is not a contradiction; that the attitudes themselves really terminate upon different thoughts of self. The child imitates his elders, not from choice, but from his need of adaptation to the environment; for it is his elders who know more than he does, and who act in more complex ways. But he is seldom aggressive toward his elders—that is, toward those who have the character of command, direction, and authority over him. His aggressions are directed mainly toward his brothers and sisters; and even as toward them, he shows very striking discriminative selection of those upon whom it is safe to aggress. In short, it is plain that the difference in attitude really indicates differences in his thought corresponding to differences in the elements of the child's social environment. We may suppose the persons about him divided roughly into two classes: those he learns from, and those he practises on; and then we see that his actions are accounted for as adaptations in his personal development.

The facts covered by this distinction—probably the first general social distinction in the child's career—are extremely interesting. The stern father of the family is at the extreme end of the class he reveres with a shading of fear; the little brother and sister stand at the other extreme; they are the fitting instruments of his aggression, the practise of his strength, the assertion of his agency

and importance. The mother usually, it seems, stands midway, serving to unite the two aspects of persons in the youngster's mind. And it is pretty clear, when the case is closely studied, that the child has, as it were, two thoughts of his mother—two mothers, according as she on occasion falls into one or the other of these classes. He learns when, in what circumstances, she will suffer him to assert himself, and when she will require him to be docile and teachable. And although she is for the most part a teacher and example, yet on occasion he takes liberties with the teacher.

Now what does this mean, this sorting out, so to speak, of the persons of the family? It means a great deal when looked at in the light of the "dialectical movement" in the development of personality. And I may state my interpretation of it at the outset.

The child's sense of himself is, as we have seen, one pole of a relation; and which pole it is to be, depends on the particular relation which the other pole, over which the child has no control, calls on it to be. If the other person involved presents uncertain, ominous, dominating, instructive, features, or novel imitative features, then the self is "subject" over against what is "projective." He recognises new elements of personal suggestion not yet accommodated to. His consciousness is in the learning attitude; he imitates, he serves, he trembles, he is a slave. But on the other hand, there are persons to whom his attitude has a right to be different. In the case of these the dialectic has gone farther. He has mastered all their features, he can do himself what they do, he anticipates no new developments in his intercourse with them; so he "ejects" them, as the psychological expression is; for an "eject" is a person whose consciousness has only those elements in it which the individual who thinks of that consciousness is able, out of his own store of experience, to read into it. It is ejective to him, for he makes it what he will, in a sense. Now this is what the brothers and sisters, notably the younger ones, are to our youthful hero. They are his "ejects"; he knows them by heart, they have no thoughts, they do no deeds, that he could not have read into them by anticipation. So he despises them, practises his superior activities on them, tramples them under foot.

Now at this earliest stage in his unconscious classification of the elements of his personal world, it is clear that any attempt to describe the child's interests—the things which he wants, as we have agreed to define "interests"—as selfish, generous, or as falling in any category of developed social significance, is quite beside the mark. If we say that to be selfish is to try to get all the personal gratification possible, we find that he does this only part of the time; and even on these occasions, not because he has any conscious preference for that style of conduct, but merely because his consciousness is then filled with the particular forms of personal relationship—the presence of his little sister, etc.—which normally issue in the more habitual actions which are aggressive, in our advanced social terminology. His action is only the motor side of a certain collection of elements. He acts that way, then, simply because it is natural for him to practise the functions which he has found useful. We see that it is natural; and on the basis of its naturalness, call him selfish by nature.

But that this is arguing beyond our facts—really arguing on the strength of the psychological ignorance of our hearers, and our own—is clear when we turn the child about and bring him into the presence of the other class of persons to whom we have seen him taking up a special attitude. We have but to observe him in the presence of his father (generally), or any one else whom he habitually imitates and learns the lessons of life from, to find out that he is just as pre-eminently social, docile, accommodating, centred-outwardly, so to speak, as before we considered him unsocial, aggressive, and self-centred. If we saw him only in these latter circumstances, we would say possibly that he was by nature altruistic, most responsive to generous suggestion, teachable in the extreme, But here the limitation is the same as in the former case. He is not altruistic in any high social sense, nor consciously yielding to suggestions of response which require the repression of his selfishness. As a matter of fact, he is simply acting himself out; and in just the same natural way as on the occasion of his apparent selfishness. But it is now a different self which is acting itself out. The self is now at the receptive pole. It is made up of elements which

are inadequate to a translation of the alter at the other pole of the social relation now established. The child's sense of self is not now of a relatively completed self in relation to the alter before him; it was that in the earlier case, and the aggression which he was then guilty of showed as much. Now he feels his lack of adequate means of response to the personality before him. He can not anticipate what the father will do next, how long approbation will smile upon him, what the reasons are for the changes in the alter-personality. So it is but to state a psychological truism to say that his conduct will be different in this case. Yet from the fact that the self of this social state is also in a measure a regular pole of the dialectic of personal growth, it will tempt the observer to classify the whole child, on the strength of this one attitude, in some one category of social and political description.

I do not see, in short, how the nature of this child can be expressed in any but social terms; nor how, on the other hand, social terms can get any content of value but from the understanding of the developing individual. This is a circle of definition, of course; and that is just my point. On the one hand, we can get no doctrine of society but by getting the psychology of the "socius" with all his natural history; and on the other hand, we can get no true view of the socius at any time without describing the social conditions under which he normally lives, with the history of their action and reaction upon him. Or to put the outcome in the terms of the restriction which we have imposed upon ourselves,—the only way to get a solid basis for social doctrine based upon human want or desire, is to work out first a descriptive and genetic psychology of desire in its social aspects; and on the other hand, the only way to get an adequate psychological view of the rise and development of desire in its social aspects, is by a patient tracing of the conditions of social environment which the child and the race have lived in and have grown up to reflect.

But the observation of the child shows us that we may carry our discrimination of his personal attitudes farther along the same lines. We have found him classifying his companions and associates by the shadings of conduct which his spontaneous adaptations

of himself show; yielding to some and studying them mainly by imitation, abusing others and asserting himself against them aggressively. This distinction gets a wider development as his experience goes on accumulating. As was hinted in the case of his attitude to his mother, that one person comes to have for him the force of several, or of both of the two great classes of persons. Sometimes he tyrannises over his mother and finds her helpless; at other times he finds her far from submitting to tyranny, and then he takes the rôle of learner and obedient boy. Now the further advance which he makes in this general sense of the social situation as a whole, is in the line of carrying this same adaptability of attitude into his relation to each of the persons whom he knows. Just as he himself is sometimes one person and again another, sometimes the learner, the altruist, the unselfish pupil, and then again the egoist, the selfish aggressor; so he continues the dialectical process by making this also "ejective" to him. He reads the same possibility of personal variation back into the alter also. He comes to say to himself in effect: he, my father, has his moods just as I have. He, no less than I, cannot be adequately considered all-suffering or all-conquering. Sometimes he also is at one pole of the self-dialectic, sometimes at the other. And so is my mother, and my brother and sister, as they grow older,—indeed, so are all men.

So it then becomes his business not to classify persons, but to classify actions. He sees that any person may, with some few exceptions, act in either way: any person may be his teacher or his slave, on occasion. So his next step in social adaptation is his adaptation to *occasions*,—the group of social conditions in which one or the other class of actions may be anticipated from people generally. And he makes great rough classes in which to put his "ejects"—his read-out personalities about him—according to his expectations of treatment from them. He learns the signs of wrath, of good humor, of sorrow, of joy, hope, love, jealousy, giving them the added interpretation all the time which his own imitation of them enables him to make by realising what they mean in his own experience. And so he gets himself equipped with that extraordinary facility of transition from one attitude to another in his re-

sponses to those about him, which all who are familiar with children will have remarked.

Now all these changes have meaning only as we realise the fact of the social dialectic, which is the same through it all. There are changes of attitude simply and only because, as the psychologist would express it, there are changes in the content of his sense of self. In more popular terms: he changes his attitude in each case because the thing called another, the alter, changes. His father is his object; and the object is the "father," *as the child thinks him*, on this occasion and under these circumstances, *right out of his own consciousness*. The father-thought is a part of the child's present social situation; and this situation in the child's mind issues in the attitude which is appropriate to it. If it be the father in wrath, the situation produces such a father out of the child's available social thought-material; and the presence of the combination in the child's mind itself issues in the docile, fearful attitude. But if it then turn into the jovial father, the child does not then reverse his attitude of himself. No, the father-thought is now a different father-thought, and of itself issues in the child's attitude of playful aggression, rebellion, or disobedience. The growing child is able to think of self in varying terms as varying social situations impress themselves upon him; so these varying thoughts of self, when made real in the persons of others, call out, by the regular process of motor discharge, each its own appropriate attitude.

But see in this more subtle give and take of elements, for the building up of the social sense, how inextricably interwoven the ego and the alter really are! The development of the child's personality could not go on at all without the constant modification of his sense of himself by suggestions from others. So he himself, at every stage, is really in part someone else, even in his own thought of himself. And then the attempt to get the alter stript from elements contributed directly from his present thought of himself is equally futile. He thinks of the other, the alter, as his *socius*, just as he thinks of himself as the other's *socius*: and the only thing that remains more or less stable, in the midst of the whole growth, is

the fact that there is a growing sense of self which includes both terms, the ego and the alter.

In short, *the real self is the social self, the socius.*

And if we think it worth while again to raise the question as to what such a self pursues when, as we say, he identifies his interests with his wants, the answer is just as before. The growing subtlety of the dialectical process has not changed the values which the elements represent to the child. What he wants in each circumstance is expressed by his attitude in that circumstance; and it changes with the circumstance. He is now a creature of burning self-assertion, eager to kill and destroy in all God's holy mountain; and presto! change, he is now the lion lying down beside the lamb. His wants are not at all consistent. They are in every case the outcome of the social situation; and it is absurd to endeavor to express the entire body of his wants as a fixed quantity under such a term of description as "selfish," "generous," or other, which has reference to one of the various situations only.

So far, therefore, in our search for a definition of the "interests" of the individual, in relation to his social environment, we find a certain outcome. His wants are a function of the social situation as a whole. The social influences which are working in upon him are potent to modify his wants, no less than are the innate tendencies of his personal nature to issue in such wants. The character which he shows actively at any time is due to these two factors in union. One of them is no more himself than the other. He is the outcome of "habit" and "suggestion," as psychology would say in its desire to express everything by single words. Social suggestion is the sum of the social influences which he takes in and incorporates in himself when he is in the receptive, imitative, attitude to the alter; habit is the body of formed material, already cast in the mold of a self, which he brings up for self-assertion and aggression, when he stands at the other pole of the relation to the alter, and exhibits himself as a bully, a tyrant, or at least, as master of his own conduct. Of course, heredity or "endowment" is on this side. And the social unit of desire, as far as the individual is taken as the measure of it, in any society, is the individual's rela-

tively fixed conduct, considered as reflecting the current social modes of life.

It is easy to discern in the behavior of the child from about five years old, the blending of these two influences. Two children in the same family will differ possibly by all the width of the distinction current in psychology by the terms "sensory *versus* motor" in their types or dispositions; and yet we may see in them the influence of the common environment. One acts at once on the example of the father; the other reflects upon it, seems to understand it, and then finally acts upon what he thinks it means. The motor child learns by acting; the sensory child learns and tests his learning by subsequent action. But both end by getting the father's essential conduct learned. Both modify the thought of self by the new elements drawn from the father; and act out the new self thus created: but each shows the elements differently interpreted in a synthesis with the former character which he had.

Or take the same process of incorporating elements of social suggestion as they are absorbed respectively by a boy and a girl of about the same age. The differences of sex is a real and fundamental difference, on the side of what is called "endowment"; so we should expect that the same social suggestions given them would be taken up differently by them, and show different interpretations when the child of one sex or the other comes to act upon them. The boy is generally more aggressive, more prone to fall into the self-pole of high confidence in his abilities. And we find him refusing certain forms of suggestion—say those coming from a female nurse—which the female child readily responds to. Farthermore, the boy is capable, just for the same reason, of standing up to the rougher elements of his social *melieu* which only frighten and paralyse his sister. And when the same suggestion is given to the boy and girl together, the former is likely to use it wherewith to exercise himself upon animals, etc., while the girl is more likely to use the new act strictly in an imitative way, repeating the actual conduct of others.[1]

[1] Of course, we can only say "more likely" in each instance, and in the other distinctions between them as well.

But apart from the attempt to reduce these active interpretations to general classes, it is enough here to point out the extraordinary variety which the same suggestions take on in the active interpretations by different children; and to point out with it the need of recognising the fact that in this interpretation by the child there is always the fusion of the old self with the new elements coming in from the selves external to it. Every conscious interpretation of human action is, I think, of this essential kind. We think the deeds of others as we bring ourselves up to the performance of similar deeds; and we do the deeds of others only as we ourselves are able to think them. In the case of the young child in the family, we may often tell how far he is learning correctly, and the particular alter from whom he has taken his lesson. But in the larger social whole of adult life both elements are so complex—the solidified self of the individual's history is so fixed, and the social suggestions of the community are so varied and conflicting—that the outcome of the fusion is a thing that no man can prophesy.

So much for the individual child and his growing social personality. We see in a measure what his interests are—that is, what elements go to make his interests up. Let us now turn to the rest of the family in which he lives and briefly state the same inquiry in respect to them. Do the interests of the family conflict with his?

Waiving the inquiry into the interests of the family group as a whole, that is, the question of objective interests apart from actual want or desire (as we did in the earlier case), our question now is about this: what can be said of the wants of the other individuals of the family in which the young hero, whose life we have so far described, lives and exploits himself? This seems to be answered, certainly in part, by the consideration that they have each been through the same process of growth in securing the notion of self, both the ego-self and the alter-self, that he has. Each has been a child. Each has imitated some persons and assaulted others. So, of course, of the other members of the flock of children in the family; for they are the very specimens of the alter which have furnished to the hero his "socii" all the way through. So we have only to make them one by one hero in turn to see that then all the

others becomes socii; and the group development replaces the individual development. Even the parents are in great measure capable of the same interpretation; since they have furnished the largest amount of personal suggestion to all the children: and the children, in imitating one another, aggressing upon one another, etc., are really perpetuating the features of social life which characterise the parents' life. No family, of course, lives in such isolation as to be in any sense obliged to support itself upon its own social stock from one generation to another; and there is the further modifying influence of the peculiar interpretation given to his social suggestions by each child, spoken of above.[1] But apart from the personal form in which the family suggestions are worked over by each child, we may say that the material of the social life of the family is largely common stock for all the members of the family.

This means that the alter to each ego is the same self as the ego; and that what has been said of the wants of the ego being not egoistic in the selfish sense, nor generous in the altruistic sense, but general in the social sense, holds of the family group as a whole. What each child wants for himself, he wants more or less consciously for each member of his family. While he may assault his brother, viewing him as an alter to practise on in certain circumstances, how soon he turns in his defence in the presence of the alter foreign to them both, when the larger social ego of them both swells within his breast! What boy among boys, what school-fellow among his companions, what Rob-Roy surrounded by the clan has not felt the socius, the common self of the group, come in to drive out the narrower ego of his life within the group? This is not to say that the interests of the group may not be more clearly seen by one member than by others, nor that direct conflicts may not arise in which some one ego will refuse to yield to the demands of the socius of the group. Those things may well be, and are. To say the contrary would be to say that the development of all the individuals was equal. For if each has his ego and his alter only by the assimilation of suggestions, then the amount of assimilation, of progres-

[1] The degree of "originality" or "invention," which each child shows.

sive learning of the possibilities and relationships of conduct must indicate what the sense of social good is to him. His insistence on his interpretation, however, is no more egoistic and selfish than is the insistence by the other members of the family on a different line of conduct. His double self, giving the socius, is in advance of theirs, but it arises in just the same way; and it is just his social nature which compels him to fight for what seems to be a private and selfish interest.

Apart from the apparent exceptions—not really such—now noted, we may say, therefore, that the interests of the family group are reflected in the wants of each member of the group. Hatred of society in this primitive family form of it, is pathological,—if indeed it be possible. Nothing but an upheaval of the foundations of personality can eradicate the sense of social solidarity in every child in a family. And the ultimate sanction for family life and its only permanent safeguard is here. No legal provisions could have originated it, no personal conventions advanced it, nor can it be endangered by foes from without. Nothing but the kind of suggestion in education which would replace the sort of socius represented in the family, by another sort, through the same process of identification of the self with its alter all the way through the history of the growth of personality, could affect it materially one way or the other.

Moreover, it is just this fact of identity of personal and family interests which is responsible for the rise of the family considered from an evolution point of view. Animal families, if they are to survive as families, must be made up of individuals having ingrained in their instinctive life the social qualities which make the animal's own struggle for existence at once also a struggle for the existence of the family group as such. So the child, in his personal growth, must become a person by becoming a socius. To separate the two is to annihilate the individual person: just as to eradicate the family instinct in the animal is to destroy his private chance for survival, or if not that, at least to prevent the raising, and perhaps the very begetting, of a second generation.

To trace the matter farther in the wider fields of social life would take us beyond our present limits. J. MARK BALDWIN.

SOME POINTS IN INTRACRANIAL PHYSICS.

IT IS NOT only in discussing the phenomena of mind that the use of metaphysical terms is not merely convenient but imperative. To impute personality to objects, and when abstract notions have been formed to regard these as representing entities,—to endow them with the attributes, passions, powers we ascribe to persons,—are among the earliest efforts of the nascent intelligence. The most highly-trained intellect still finds it convenient to adopt the same plan, and in certain directions finds it difficult to improve on it.

In the development of mind, impression is the first stimulant of consciousness; appearance—color or form—is the earliest recognition of an impressing agent; variety and movement are among the first perceptions. Control over certain movements of the body, as in grasping, pushing, pulling, gives an instinctive notion of power; and the idea of power, once got hold of, dominates our interpretation of every appearance and movement.

It is characteristic of the rational mind that it must seek for causes, and if need be, invent them. It is not content, for example, to describe a feeling, and to say a body *is heavy;* it desires a reason and says it *has weight.* Wherever work is done the presence of a working agent—of a something that can exert power—is inferred. Such words as "nature," "life," attraction," are constantly on the lips and are regarded as workers. They are spoken of as if endowed with Will, and as acting with an end in view. An anthropomorphic tendency or mode of expression will thus obtrude itself, whether an attempt is made to explain the rolling of a billiard ball, or to fathom the mystery of a first cause.

No term in the language is more wide-reaching in its application—none is more metaphysical—than the word Energy. It refers to the most generalised concept that has yet been given to account for the behavior of matter. It is the central *genus* round which cluster gravity and cohesion, heat, affinity, and other *species*. No appearance—no physical change in the material universe—can be interpreted without the assistance of one or several of its forms. It is the potential of all existence, of all experience, of all force. It is

> "A spirit of activity and life
> That knows no term, cessation, or decay;
> . . . . . .
> But, active, steadfast, and eternal, still
> Guides the fierce whirlwind, in the tempest roars,
> Cheers in the day, breathes in the balmy groves,
> Strengthens in health and poisons in disease."[1]

If we attempt to define with precision what energy is "in itself" we must simply move in a circle. We are told it is "the power of doing work." But what is power? Another metaphysical word. It is energy in efficient relation to some definite end, and work is evidence of energy spent. In short, energy is an interpretation—an imputed virtue—an article in the creed of scientific faith—a something that satisfies the reason in trying to account for work done.

As a simple fact of existence, however, matter and energy are one and indissoluble. The necessities of language may require their separation in thought, but what we can alone investigate is the behavior of matter. That which gravitates or is heavy is a material body; the atoms that clash together or fly asunder in the play of chemical affinity are solid[2]; it is the commotion of molecules that communicates the feeling of heat; if the ray of light fail to meet and to agitate material particles it remains "darkness visible." We may talk of inertia but cannot conceive of matter being

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[1] Shelly.—The whole of the apostrophe to the "Spirit of Nature" in *Queen Mab* reads like a rhapsody on the doctrine of the conservation of energy.

[2] It would not affect the argument if atoms are "small, soft, flexible, or liquid masses."

absolutely *inert*. If it has form—if it occupy space—it must have properties. When acted on it will react; when put in motion it may communicate motion.

Energy doing work becomes force. Force implies motion and has its origin in disturbed equilibrium—in a difference of degree or kind or position.

It is no part of our plan to enlarge on the various kinds of energy or their modes of working. We must, however, glance shortly at some of the characteristics of energy as manifested in organised structures.

Life is a great worker, but it is rather a cluster of energies than by itself a specific form. It is often spoken of as—and, indeed, believed by some to be—an agent which can compel or control motion in opposition to ordinary physical laws. As weight, however, is not something added to bodies, but is implied in the very constitution or concept of matter, so life is simply evidence that several kinds of energy are so co-ordinated that they work in harmony towards one end. The instruments are so small, the motions so subtle, the lines of force so mixed, that it may be impossible to trace all the individual links in the combination and sequence of changes. But science, like theology, has its articles of faith, and one of these is that no break in the continuity of motion can possibly occur.

The solution of the problem lies in the subtle but powerful nature of molecular energy. Capillary attraction, osmosis, chemical affinity, heat, and other physical agencies act each in its own mode. They thus promote the movement and development of protoplasm in the cell, stimulate the growth of tissues, and condition the exercise of function. The force at individual points may be infinitesimally small, but, acting at innumerable centres and through myriads of lines of action, it may be used to so much advantage that, like the impulse from a piston in the hydraulic press, its effects may be great and far reaching. In time these are shown in the formation of large structures or powerful instruments. "As we "look at the roots of a mighty tree, it appears to us as if they had "forced themselves with giant violence into the solid earth. But "it is not so; they were led on gently, cell added to cell, softly as

"the dews descended and the loosened earth made way. Once "formed, indeed, they expand with enormous power, but the spongy "condition of the growing radicles utterly forbids the supposition "that they are forced into the earth."[1]

A necessary condition of the development of growing structures is a certain amount of physical restraint. This moulds form and determines the direction of growth. Even in the simplest cell the diffusion of fluids and the movement of granules require the restraint of the cell wall. Without such limiting influence the speck of protoplasm would be speedily resolved into amorphous matter. Under repression the growth or multiplication of cells gives rise to expansive pressure. This, if met by opposing pressure, reacts on the molecules themselves and leads to tension—to an improved adjustment—to storage of energy. The tension becomes a force which, as in the bud, the seed, the egg, can compel firm envelopes to give way, and thus the growth of structure is allowed to proceed in the direction of least resistance.

"Development, then, is due to increase under limit; it is de-"termined by resistance. Is it not self-evident? Conceive of an "ovum germinating with all other circumstances unaltered, but "with no external limitations, no membranes, no uterus, nothing "to check expansion in any form. Could anything else result but "a shapeless multitude of cells?"[2] The bearing of all this on intracranial physics will be seen immediately.

The skull may be regarded as a gigantic cell in whose interior the play of various kinds of energy is powerful and unceasing. It is unnecessary here to enlarge upon it as an organ of protection. Its qualities in this respect speak for themselves. We have simply to handle it—to notice that by their configuration and texture its walls are so constructed as to ensure in the most economical manner lightness, strength, and elasticity—in order to recognise its fitness to protect an organ of such delicate structure and important function as the brain.

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[1] Hinton. "On Physical Morphology." *Brit. and For. Med. Chirurg. Rev.* Oct., 1858.

[2] Hinton. *Op. cit.*

But it has another and at least equally important office. It is able to place severe restraint on the forces battling within its cavity, and the thesis I wish now to submit and support in the present paper is that such restraint is necessary to enable the brain to accumulate or concentrate its specific form of energy, and to permit the latter to be liberated with economy and precision.

Assuming in the meantime that an expanding force exists, and that in certain circumstances the brain would become more bulky if the restraint of the cranial wall were withdrawn, it is at once obvious that the greater the expansive force, the greater too must be the reaction on the brain itself. That is to say, *stress*—the tension of combined action and reaction—must be increased. This stress will be equalised through the whole cranial cavity. The brain itself floats on, and is so thoroughly permeated by fluids, that the law of fluid pressure must come into play, and the tension, therefore, will not be greater at one point than at another.

But although stress be equalised, the solid elements of the brain itself may to a limited extent be displaced. They may be so pushed aside by the fluids being augmented or diminished in particular vessels, that from this cause the outcome of the brain's activity may be greatly modified.

Our first step, then, must be to determine the sources of pressure and the factors that may influence its amount and direction.

The main source of intracranial pressure is, of course, the movement of blood in the vessels. The brain is the most vascular of organs, and is fed by four arteries of considerable size. These anastomose freely at the inner base of the skull, and form a circle from which a supply of blood can be readily directed to any part of the brain where for the moment there is a demand for it.

We do not require here to trace in detail the distribution of the various arteries. Suffice it to say they all lose themselves in the *pia mater* in a remarkably fine network of vessels. When they penetrate the brain they are too minute to be traced further with the scalpel. Practically, therefore, the arterial circulation of the whole brain mass is entirely capillary.

Through vessels also of capillary minuteness the venous blood

is returned to the veins of the *pia mater*. Having reached this membrane they coalesce, and becoming gradually larger, they cross the surface of the convolutions and empty themselves into the "sinuses" of the *dura mater*. These are channels tunnelled through the firm inelastic tissue of that membrane, and we may afterwards find a reason for such a termination.

The *pia mater*, then, is quite a unique structure. It is simply a complex web of minute arterial and venous vessels. As seen when the *dura mater* is removed it closely invests the whole brain and lies like a fine pad between opposing convolutions.

An interesting mechanical problem here presents itself. How is it that strangulation does not frequently occur in the circulation of the *pia mater?* On the one hand, we have the brain mass, a large, very vascular body whose circulation we may assume is liable, like that of every other organ, to considerable variations; and in immediate contact, but lying completely external to it, is this membrane with a double plexus of vessels, one set feeding and the other draining the nerve-tissues. Now, if an expansive impulse be given to the brain through the arterial vessels, how is it that the membrane is not so compressed against the *dura mater* as to check its circulation altogether? Such an accident would, of course, be serious. It would involve the immediate collapse of the brain-functions.

By keeping this problem in view we will be led to notice some interesting peculiarities in the intracranial circulation and pressures.

In the first place, the arteries enter the skull in a curious fashion. The internal carotid before and after it has left the temporal bone is curved like the letter *s*, and the vertebrals take also a tortuous course on piercing the *dura mater*. Such an arrangement must lessen any direct impetus given to the brain circulation by the action of the heart.

Then the extent to which the arteries at the base of the brain can be over-filled must be extremely limited. The cranial cavity is not only absolutely full, but as it is flushed with fluids moving, as we shall afterwards find, under considerable stress, it may be said to be tensely filled with incompressible material. It is obvi-

ous, therefore, that not a drop of blood can enter by the arteries unless an exactly equivalent bulk is at the same moment discharged by the veins. It is also evident that if some sudden impetus threatened to distend the brain beyond physiological limits, its mass would at once react by pressure on the larger arteries themselves and check the flow of blood through them by diminishing their calibre.

A third factor is the relation of the blood in the intracranial veins to the pressure of the atmosphere. As this relationship is one of importance it requires to be treated with some detail.

A glance at the solid structure of the adult cranium may convince any one that the weight of the atmosphere cannot bear directly on the contents of its cavity. Numerous foramina exist, but in the clothed skull every one of these is securely plugged. No fissure can be detected by which the air-pressure can possibly insinuate itself.

Through the blood-vessels, however, that enter or make their exit at the base of the skull, an indirect but most important influence can be brought to bear. Throughout the whole vertebrate kingdom, whatever may be the shape of the skull, or however completely the body of an animal may be encased in unyielding structures, there is always in the neck such an amount of soft textures as will allow the atmospheric pressure to bear on the blood-vessels in that region. As pressure on a fluid is communicated in all directions, then through these vessels the atmosphere may be brought to bear on the whole interior of the cranial cavity. It will be directed therefore, not on the external surface of the vessels, as in most other parts of the body, but on their *internal* surface.

Such a relationship ensures constant fulness of the cranial cavity. Moreover, a little consideration may show that within the latter the mass of blood must be remarkably uniform. The principal contents of the cavity are the brain-substance, the blood, and the cerebro-spinal fluid. No one of these constituents can be altered in bulk unless one or both of the others be altered inversely. So long, therefore, as the brain-substance and the extravascular fluid remain unchanged, the absolute quantity of blood within the intra-

cranial vessels must also remain unchanged, although in its mode of distribution it may be liable to endless variations. Some physiologists suppose that the cerebro-spinal fluid can readily flow to and from the spinal canal and thus affect the mass of blood within the cavity, but we will afterwards find reasons to question the correctness of that opinion.

An obviously important purpose is gained by this relation to the atmospheric pressure. The untoward effect of gravitation on the circulation within the head is completely counteracted. Were the cranial wall as pliable as that of the abdomen, the brain would be liable to endless changes in its amount. Indeed, it would be simply impossible to maintain the erect posture on account of the draining that would immediately take place from the vessels.

Again, in its immediate action on the intracranial circulation, the tendency of the atmospheric pressure will be to favor the movement onwards in the arterial vessels, and to oppose that in the veins. It is to the latter circumstance we have especially to attend at present. The moving blood in the veins must at every moment be subjected to a *backward pressure*, the tendency of which must be to retain the blood within the cavity. It will be communicated through the sinuses of the *dura mater* onward to the smallest veins in the *pia mater*, and from the tension so produced it will prove an important means of preventing the circulation in the membrane from becoming strangulated.

How, then, it may be asked, how can the blood escape from the intracranial sinuses? It can only do so by an equilibrium of pressure being maintained between the surface of the body and the cranial cavity. If the pressure within the latter balances that on the surface the flow of blood will not be interrupted; if it be to the least extent lower, the blood will refuse to circulate. Its exit would be effectually blocked by the atmospheric pressure.

As the moving blood is the agent which directly produces the internal pressure, it becomes important to determine the factors that condition its volume and velocity in the intracranial vessels. Is the action of the heart on the general circulation sufficient to keep up the required pressure, or must some further special assist-

ance be afforded to the capillary circulation? These questions will lead us to discuss the most important of all the problems in intracranial physics.

That the amount of blood determined to individual parts is in proportion to the demand for it is a principle that applies to every tissue and organ in the body. Functional activity increases and rest lessens the demand. In an actively secreting organ, as, for example, the mammary gland, the amount of blood in and transmitted through its vessels in a given time is much greater than when its function is in abeyance.

Considerable difference of opinion exists as to the mechanism by which local distribution is modified. Many eminent physiologists insist that the only source of impulse to the circulation is the action of the heart, and that the vasomotor nerves are to be credited with the power of promoting or limiting local supply. That the action of these nerves may influence the circulation is undoubted, but that they alone are responsible for every local change may be more than questioned. A great deal may be said in favor of the opinion that metabolic activity in the tissue itself has directly to do with local circulation.

In an essay like the present we cannot enlarge on all the side issues that may open up, but as this point is an important one in our discussion I may venture to submit a single "stubborn fact" that bears directly on the question.

Every one who knows anything of anatomy is aware that in the abdomen all the blood returned from the stomach, intestines, etc., has to pass through the liver before it can reach the vena cava, and so be transmitted onwards to the heart. It is first collected into one large vessel—the portal vein. This divides into two branches which enter the liver, one to each lobe. There they subdivide like an artery *until they become minute capillaries;* then gradually uniting and enlarging they form the hepatic vein which empties into the vena cava.

The problem here is: how is this portal circulation kept up? Evidently considerable force must be required to enable such a mass of blood to traverse such an extensive and minute ramifica-

tion of vessels. Then, unless one of the most fundamental principles in physics be suspended, *that force must react as backward pressure on the blood in the mesenteric veins.* But these are weak, thin-walled vessels that are quite unfit to bear any serious strain.

It has been argued that the suction force of the heart, acting as a *vis a fronte*, is sufficient to enable the portal circulation to be carried on. An obvious fallacy may be detected here. If the suction of the right auricle can affect the movement of blood in the mesenteric veins, it must be because the pliable wall of the abdomen can permit the pressure of the atmosphere to bear on these vessels. But the same pressure will also bear on the whole external surface of the liver, and thus that on the veins is completely neutralised, so far as power to influence the portal circulation is concerned.

What, then, are the forces that keep up that circulation? A survey of all the surroundings precludes the notion of any mechanical force urging the blood onwards from behind. We are therefore driven to the conclusion that, however obscure the mode of operation may be, the unceasing commotion of the tissue molecules must have to do with the movement, as must necessarily be the case with that of fluids in the vegetable kingdom. Just as in brisk combustion, the air, in spite of the repelling influence of intense heat, is drawn with some force from one direction and hurried on in another, so in all the textures where metabolism is going on, the physical interchanges between the fluids within and outside the capillary walls, the chemical affinities, the attractions and repulsions, the inconceivably rapid oscillation of the molecules, all go to constitute a force which draws the blood onwards and *actively* transmits it through the capillaries.

Assuming this view of the capillary circulation to be tenable, we shall find not only that its application to the brain is most important, but that within the skull we may also find convincing evidence of its correctness.

In restricting attention to intracranial *physics*, we have to study the brain as we would any instrument whose energy may at one time be potential and at another kinetic. The essential or domi-

nant factors and the influence of surroundings in modifying the activity of these; the conditions that affect the storage and conservation or intensity of energy, and those that stimulate its liberation or determine the direction of its discharge,—such are some of the points that must be settled before the action of the brain as a physiological organ can be understood.

The dominant factor in intracranial physics is undoubtedly the molecular activity of the grey matter of the brain; and concomitant with that is the circulation of healthy blood. Could some subtly penetrating *x*-rays reveal to us the interior of the working brain, we should find ourselves looking into a veritable maelstrom of commotion. The blood rushing and surging in all directions; myriads of fibrous structures quivering intensely, and the molecules of grey matter oscillating with inconceivable rapidity,—all which, in the absence of demonstration, the imagination to the extent of its faculty must *see*.

So intimate is the relation between the molecular activity and the capillary circulation, that these two agencies must be regarded as practically one factor. In every manifestation of the brain's functions they must work in harmony. In the production of heat or light in ordinary combustion, the carbon and oxygen are *one*, and the specific energy of the brain tissue can no more be exercised without free circulation of blood than fuel can burn without air. The molecular commotion powerfully attracts the blood; the latter conditions the activity of the brain cells and determines the amount and direction of pressure.

If, then, we can specify with a moderate amount of precision some of the conditions that control or modify the movement of the circulating fluid, we may to that extent be able to explain—not the translation of molecular into psychical energy, but—various aspects of cerebral activity, just as the engineer knows how the heat of his furnace may be modified by regulating the supply of air to the fuel.

Taking, then, the brain in full swing of activity,—responding to present, or reviving and weaving into endless combinations former impressions,—charged with an energy which, when liberated, is correlated to the subtlest psychical activity,—the blood will at

the same moment flush the capillaries with an actively distending pressure, the brain mass will be at its fullest bulk, and its discharging energy at the strongest. But if energy, potentially strong, be diffused, power is lost. Some physical restraint is essential in order to control the direction of motion and to condition the amount of force. Under repression energy accumulates; it becomes more intense, more concentrated if directed into some special channel; more ready to cause explosion if an easy pathway is not opened. In the brain, therefore, outward pressure is speedily met by counterpressure, partly passive in the unyielding cranial wall, partly active in the energetic movement of fluids on its external surface.

We thus become impressed by the circumstance that the functions of the brain must be exercised under considerable stress. Individual forces seem to be acting in direct antagonism to one another. Currents of fluids are rushing with great velocity and pressing in opposite directions. Then remembering that all this takes place in a space whose capacity is rigidly fixed, we find there must be great tension within the whole cranial cavity.

In physics we have endless illustrations of the behavior of energy under stress. It strives to reveal itself, and all nature gives evidence of its success. The super-heated steam, surging in vain against the walls of the boiler, spends its force on the piston and puts powerful levers in motion. The illustration which perhaps affords the best analogy to the conditions of nervous energy is the storage and discharge of electricity in the accumulator. The molecular structure of certain substances with suitable surroundings can be so charged with that form of energy, that notwithstanding violent commotion in the material particles, it can be confined like water in a cistern and may thence be tapped with marvellous precision.

One of the immediate physical results of uniform tension through the cranial cavity will be that a tendency to vibration will be favored. The brain-substance itself is pulpy, and no more able to vibrate than a bit of soft clay, but under the tension of energetic molecular motion and active capillary circulation the whole contents of the cavity will be subjected to the laws of fluid pressure,

and a thrill at one point may make its influence felt through the whole space. The brain may thus be likened to a musical instrument with its chords all taut and ready to respond with a clear tone to the slightest sympathetic touch.

As is well known, Dr. Hartley traced all the functions of the brain, whether receptive or responsive, to vibrations. The speculations of that author have been considered obsolete and are now seldom referred to, but, although his physiology is vitiated by the circumstance that he places the whole energising power in the "white medullary substance," and that he does not enter into the physical conditions of vibrations, some of his "observations" may still be worth recalling.

"External objects impressed upon the senses occasion, first, in the nerves on which they are impressed, and then in the brain, vibrations of the small, and, as one may say, infinitesimal medullary particles.

"These vibrations are movements backwards and forwards of the small particles; of the same kind with the oscillations of pendulums, and the tremblings of the particles of sounding bodies. They must be conceived to be exceedingly short and small, so as not to have the least efficacy to disturb or move the whole bodies of the nerves or brain. . . .

"The vibrations are excited, propagated, and kept up partly in the ether, i. e., in a very subtle and elastic fluid, and partly by the uniformity, continuity, softness, and active powers of the medullary substance of the brain, spinal marrow, and nerves. . . .

"One may conjecture, indeed, that the rays of light excite vibrations in the small particles of the optic nerve by a direct and immediate action, for it seems probable from the alternate fits of easy transmission and reflexion, that the rays of light are themselves agitated by very subtle vibrations, and consequently that they must communicate these directly and immediately to the particles of the optic nerves. . . .

"As soon as the vibrations enter the brain they begin to be propagated freely every way over the whole medullary substance; being diminished in strength in proportion to the quantity of matter agitated."[1]

Hartley's conjectures as to the transmission of impressions are probably quite correct, and the intracranial tension will help to sustain the vibrations through the brain-substance. Having traced

[1] *Observations on Man; His Frame, His Duty, and His Expectations.* By David Hartley, M. D. (1749.)

these to the sensory centre, and found the molecular energies of the latter in such play as to impress the consciousness, the physicist stops. Unlike Hartley, he does not venture to affirm that sensations *are* vibrations.

Turning to the motor centres and still restricting attention mainly to physical conditions, we shall find that something more than molecular and capillary activity is required for the successful discharge of their energy. If the principle that action and reaction are equal and contrary is of universal application, it must apply not only to the brain as a whole, but also to every energising centre, whether it subserves sensory, motor, or higher functions. In discharging its energy each motor centre has, of course, it own molecular activity greatly raised. This involves more excited circulation and consequently greater outward pressure. Now, if this is not met by a sufficiently stable reaction-pressure, the result will be failure of function. If the surrounding structures, instead of resisting, yield by allowing themselves to be pushed aside, tension in the centre will be lessened, energy will be diffused, and the resulting force will bear with less effect.

A one-pound weight can be lifted with ease; in lifting fifty-six pounds considerable effort is required. The arm muscles involved are in each case the same; the physical action of the brain must be very materially modified.

The nerve-centres in the brain for the muscles of the arm are very limited in extent, and are formed of material that, if exposed, might be bruised to pulp by the pressure of a finger. How is it that their energy can be so concentrated that powerful effects can be produced?

In lifting a heavy weight with the hand, provision must be made for preserving the equilibrium of the body itself, and the means required for this purpose also serve for giving the necessary support to the energising centre. The assistance of a large number of other muscles is required, and as one after another is called into play, tension in a series of corresponding centres is also increased. The stress so occasioned being equalised through the whole cranial cavity, the means of concentrating energy in a limited area are af-

forded. A fulcrum is found for the moving power. Thus the energetic use of a very few muscles may involve the active co-operation of the whole cerebral apparatus. Straining tension on the one hand and steady support on the other are essential. However strenuously the Will may attempt to operate, it will fail in the presence of a flaccid brain. We may as well expect the piston of an engine to be efficiently raised when there is a rent in the boiler, or look for a brilliant stream of electric light by simply rubbing a bit of amber.[1]

If our arguments as to the existence and degree of intracranial tension be tenable,—if pressures occur simultaneously from various directions, and if the stress so occasioned is necessary for efficient discharge of function,—two corollaries may be drawn. In the first place, something more than the *vis a tergo* from the action of the heart will be required to maintain the cerebral circulation. The influence of vasomotor nerves here is *nil.* The most careful research has failed to discover their presence, and yet changes in local distribution through the brain must be of constant occurrence. The blood will move through the vessels, not passively, but with an actively distending force resulting from the direct influence of molecular changes. These powerfully *attract* the blood and urge it onwards through the vessels.

In the second place, the opinion of physiologists as to the behavior of the cerebro-spinal fluid must be modified. There can be no question as to the immense importance of this fluid. Wherever one part of the brain so overlaps another that the surfaces are not

[1] An interesting illustration from pathology may be given to show how an important influence, purely physical in its nature, may be exerted by one centre on another. In the disease called "locomotor ataxy" the power of so co-ordinating the muscles as to control the *direction* of movement is greatly impaired. There is no paralysis, but the muscles fail to work in harmony. The spinal cord is considered to be the principal seat of disease, but tone appears to be lowered in all the higher nerve centres. A patient so affected may stand with tolerable steadiness *so long as he keeps his eyes open.* But let him shut his eyes and he not only becomes unsteady, but, if not supported, *he will fall heavily to the ground.* Thus the centre for vision when active—keeping a certain hold on its circulation and therefore on cerebral pressure—affords such favorable mechanical conditions for the play of some motor centres, that if in certain circumstances its influence be withdrawn no effort of the Will can prevent complete collapse.

in perfectly close apposition, there we have it present. Its use is to give such an amount of steady hydrostatic pressure as will maintain an equal strain through the cranial cavity, and thus to prevent jolt or jar to the delicate nerve-structures. But if it can fluctuate between the cranial and spinal cavities with the ease many writers assert, it would become a source of positive danger instead of being an important agent in conserving the brain's energy. If any sudden or strong strain be required, it would be apt to move away when its passive but steady support may be most essential, and the conditions of successful discharge of energy would be therefore weakened. Of course, if a strain be kept up for a length of time, the fluid may be absorbed or it may be increased according as the pressure is from the brain itself or is within the veins, but as between the cranial and spinal cavities it must in ordinary circumstances be practically a stable quantity.

It would lead us far beyond the limits of a paper like the present to discuss fully the various modes in which by their mutual reactions on one another the active brain and its correlated circulation may throw light on psychical operations. I shall simply touch on a single point where the physical element is still an important factor.

The mass of blood in the intracranial vessels being practically a fixed quantity, no alteration can occur in one set of vessels or in one region of the brain without an inverse change taking place in some other quarter.

If we take the brain at any moment when its functions are quiescent but not suspended, a certain equilibrium in its circulation must be present. This equilibrium will be disturbed at once if a stimulus—sensory, volitional, or ideational—call any special centre into brisk activity. The blood will be determined toward that point in fuller volume. This focussing of the circulation will react on the centre itself and condition or increase its energising powers. Its function will be exercised with greater efficiency. But as the absolute mass of blood that can be drawn on is limited, less of that fluid can at the same moment be allowed to other parts, and therefore the functional capacity of the latter must be lowered.

For example, if the centre for vision be impressed by an extensive landscape, and the consciousness is engrossed in discriminating its varied features in detail,—hill and valley, forest and meadow, river and lake,—the centres for ideation must be deprived of such share in the circulation as is required for successful energising, and the reasoning faculty will be therefore in comparative abeyance. On the other hand, if the solution of some problem requiring close consecutive thinking is being successfully carried out, the balance will be away from the sensory centres and impressions on these will be blunted. The features of the landscape now become blurred or they are not at all noticed.

The existence of some such principle—the possibility of an infinitesimally graduated equilibrium in the circulation occurring in response to local molecular requirements—must underlie and condition the various phases of attention; and if of attention, then of volition and all the other mental activities. But we cannot further enlarge on this aspect of our subject. Enough has been said to show that it is greatly owing to the fact that the brain is "cribbed, cabined, confined" within a rigidly limited space that its functions can be exercised with smoothness and efficiency. We may now inquire, shortly, whether the elementary physical principles we have been making use of may not also be of service in discussing the conditions that are required to ensure rest to the fatigued brain.

In trying to frame a theory as to the causation of sleep, what should we look for?

In the first place, some mechanism must be discovered which, if put in action, can enforce physiological rest to the brain. The mechanism must be gradual in its operation, but ultimately so effective that that organ will for the time be unable to respond to ordinary impressions, or to afford the conditions of coherent thought. In the second place, it must be powerful enough to keep the brain's functions in abeyance sufficiently long to allow such repair or readjustment of the molecular structures to take place that a reserve of nerve energy may be stored up. Lastly, it must be such that if a stronger stimulus—sensory, emotional, or rational—shall require

it, the period of sleep may be postponed, or the soundest sleep may be broken, and a state of alert wakefulness at once restored.

A moment's consideration may convince one that metabolic change alone, or that along with simply diminished circulation, will not fulfil these indications. We can understand, indeed, that the molecular energy of the brain may be so exhausted that functional capacity for the time being will be lost; or we can suppose the circulation to be so far reduced that the brain may be unfit to subserve any mental function. But if either or both these conditions contributed all that would be necessary to induce sleep, serious drawbacks would be associated with their working. The period when sleep would supervene would not depend on the convenience of the individual, but would occur whenever a certain amount of katabolic change had been brought about. Moreover, some local centre or centres becoming exhausted before others, co-ordination among them would be lost. A state of dreaming—of incoherent thought and diminished voluntary control—would be constantly occurring. In short, mental unity would be destroyed.

An additional factor, then, is still lacking, but before referring to it, an important fact in connexion with the exercise of brain functions requires to be noticed.

If the brain be exposed by injury of the skull, consciousness can be at once suspended by a certain amount of pressure being applied to its surface. This fact has long been known. In some cases alternations of waking and sleep could be brought about at the will of the operator. The reason may possibly be analogous to the effect produced by a rude touch on a vibrating bell or wire,—vibration is checked and the tone vanishes. Also, some change in the capillary circulation is likely to have to do with it. The question, then, comes to be: have we any means—physiological in origin but mechanical in operation—available for the purpose of producing compression of the brain? If so, we may find a clue to the conditions that are effective in sleep.

Now, in the venous circulation of the *pia mater* we have such a means, and its mode of operation may be traced with tolerable precision.

We have already seen that these vessels are being constantly acted on by two opposing forces. There is, in the first place, the pressure of the brain mass on their *external* surface tending to obliterate them; and, secondly, there is the backward pressure occasioned by the weight of the atmosphere bearing on their *internal* surface, and tending to dilate them. Here then we have an interesting but simple problem in the composition of forces. Is a constant equilibrium preserved between them, or is there an ebb and flow in one or in both?

The pressure of the atmosphere may be regarded as practically a constant quantity. It of course varies, but any change will affect arterial and venous vessels alike. In ordinary circumstances, therefore, its variations cannot appreciably influence the intracranial circulation.[1]

The expansive pressure of the brain, however, varies considerably. After a certain amount of functional activity the molecular commotion naturally tends to become languid, and, as the direct result of this, the capillary circulation is less energetic. The blood pressure within the vessels must now bear outwards with less force, and the expansive tendency of the brain as a whole will therefore be weakened.

When this condition has been induced, and if the terms of the problem have been correctly stated,—if no essential factor has been overlooked,—it becomes very evident what will happen. The atmospheric pressure will now bear with greater effect within the venous vessels. It has not become stronger, but the opposing force is weaker. The vessels will become distended by the movement of blood being retarded. Until a stable equilibrium has been again reached, *more blood will enter the veins than is being expelled from the skull.*

This conclusion may be argued in another way. It is the united

[1] One reason why, in addition to the less stimulating effect of the oxygen of the air, the power of exertion is so crippled in high altitudes, may be that the greatly diminished pressure on the venous system of vessels within the skull allows the blood to escape too readily from the cavity. There is not sufficient backward pressure to serve as a fulcrum against the energising, and therefore outwardly distending, brain mass.

testimony of all those who have investigated the subject experimentally, that during sleep the brain mass *contracts*. The following is Dr. Hammond's statement as to what he noticed while observing the brain of a dog through an opening in the skull. "While this "state (of sleep) was coming on I watched the brain very atten- "tively. Its volume slowly decreased; many of its small blood- "vessels became invisible, and finally it was so contracted that its "surface, pale and apparently deprived of blood, *was far below the "level of the cranial wall.*"[1]

But if the brain tends to contract it must give rise to a *suction* effort. Is there any structure or fluid on which this can be exerted with success? It is simply impossible that a vacuum can be left. The absolute fulness of the cranial cavity must still be maintained. Evidently, the cranial wall cannot respond; it is too rigid. Nor can the fluid in the spinal canal respond, it is completely removed from the direct influence of the atmospheric pressure. The only structure that can respond is the moving blood in the veins of the *pia mater*, and it can only do so by its flow being retarded, and of course, by the vessels becoming distended.

This altered balance in the circulation does not affect the absolute mass of blood within the skull; it only affects its mode of distribution. It will still happen that for every drop that enters the cavity, an equal quantity must at the same moment be dislodged into the jugular veins.

At this stage, then, we find the following physical conditions: first, the capillary circulation of the brain diminished; second, the veins of the *pia mater* distended; and third, the mass of brain substance contracted or compressed; can we assign to these conditions any physiological significance?

Unless some serious fallacy in our argument has been fallen into, it may with confidence be submitted that in the sequence and combination of these conditions, we have sufficient material to enable us to frame a theory as to the induction and continuance of sleep. No one of them by itself can be called the *cause* of sleep.

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[1] *On Wakefulness.* By William A. Hammond, M. D.

Compression of the brain is only the last stage of a sequence, and it may be considered permissive as much as enforced. The molecular commotions are still at every step and stage the dominant factor. A slight increase of stimulus may undo the whole inhibitory process, and with molecular activity restored we have wakefulness and intelligence. The compression, however, is required in ordinary circumstances to secure a sufficiently long rest. A certain amount of vibratory energy is still maintained. Those forms of metabolic activity which are purely nutritive and reparative must be kept up. These lead to recuperation—to improved adjustment —to storage of energy—to restored function.

We can now appreciate the reason why the venous blood from the *pia mater* is emptied into channels with firm inelastic walls, instead of being carried on to an outlet in the skull in vessels of the ordinary kind. The pressure from the veins is not of a passive nature. It is derived from the *moving* fluid within them and is therefore active. The volume of their contained blood will determine the amount of pressure they exert. Then the numerous contributories to one vein would soon so increase its bulk that the pressure from it would be simply paralysing in its effect. The brain structures would fail to react sufficiently against it. The venous sinus is therefore so constructed that its capacity is scarcely, if at all, affected by pressure either from within or from without its walls.

I do not pretend to have exhausted all the modes in which the bearing of elementary physical principles on intracranial activities may be considered. I hope I have said enough, however, to show that their study deserves more attention than is usually given. In coming to close quarters with the problems of psychology more progress is likely to be made by taking a comprehensive survey of general relationships and mechanical adjustments than from exhaustive microscopic and chemical research. However interesting the facts may be in themselves, it cannot be said that much light has been thrown on the brain's mode of energising by having ascertained the size and shape and disposition of its cells and fibres. A knowledge of the molecular structure of a lever may enable one to judge of its fitness for a particular purpose, but it does not reveal

to us the laws of leverage. The relations of the moving power to the resistance to be overcome and to the point of resistance that must be stable are to be learned in other ways. So with the brain, the wider the survey we can take of the physical conditions and relations that affect its working, the more impressed will we be with the number whose influence must be focussed in every act of successful cerebration, and therefore in every manifestation of correlated mental activity. However subtle the latter may be,—however independent of all physical trammels the meditating, reasoning-comprehending soul may seem to itself to be,—the brain is still the indispensable energising agent, and as such it cannot escape the tyranny of mechanical limitations and adjustments, nor of the laws to which all motions are subservient.

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THE CONFLICT OF RACES, CLASSES, AND SOCIETIES.[1]

"WITHIN FIFTY YEARS," said Napoleon at the time of his greatest glory, and therefore when his words were accepted as an oracle, "Europe will be Republican or Cossack." Fifty years have passed and many more, and still there is not the slightest indication of its becoming the one or the other. Events must have followed the counsel of Marquis Colombe: "Between *yes* and *no*, be of the contrary opinion." For instance, we have had a Franco-Russian alliance, which, in spite of the cause which Levasseur wished to find for it in German politics,[2] was none the less a fact. And yet, Europe is not Cossack, and does not seem in the way of becoming so. France indeed is Republican, but an enthusiastic French Republican, Frederic Passy, recently acknowledged: "I do not believe it possible to hold Europe for Republicanism, much less to say that it will become so and when."[3] So the conflict between French society and the Cossack race, predicted by Napoleon, and which was to decide the destiny of Europe has not taken place. Instead there has been a Franco-Russian alliance for combating another alliance between Germany, Italy, and Austro-Hungary. These three nations, or at least the first two, as commonly considered, do not form a society, much less a race. Then what has become of the famous theory of the *Rassenkampf?* The Roumanians, the Servians, and the Slavs certainly do not form a race, and yet they

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[1] Translated from Professor Fiamingo's Manuscript by I. W. Howerth, University of Chicago.

[2] Levasseur, *La population française*, Paris, 1892, Vol. III.

[3] F. Passy, *L'avenir de l'Europe*, Paris, 1895, Vol. I.

are united in a struggle against the Magyars. The Poles in Prussia and the Danes of Schleswig, however Teutonic the latter may be by race, are engaged in a struggle against the Germans. The principle of nationality urges them on, and this principle has little to do with race.

The migrations of peoples in Europe in the Middle Ages show us tribes bound together for war-like undertakings, as for instance the Cimbrians, the Teutons, the Scythians, etc., etc. But, in a new environment these tribes were assimilated by the rest of the population. The invading race did not absorb the other, but a natural environment united both into one uniform group in accordance with the conditions of the environment.

I.

It was principally under the influence of Hegelianism that the theory of races was elaborated in Germany. In France this theory found its principal defender in Ernest Renan. In 1840 and especially in 1848 the theory became dominant, not only because German politics put it at its service, but also and chiefly because it accorded with the national and patriotic spirit that stirred the nations, and with that tendency toward unity which characterised all the peoples of Europe. "It is necessary," they said, "that the State be national, that the nation be one, and that it comprehend all individuals speaking the national language and belonging to the same race. Further, it was important that this national State reduce the heterogeneous elements, that is to say, the foreign.[1] When this theory had served its purpose and had almost completely disappeared from the political field, it still remained in the scientific field. Even to-day, with a considerable number of authors, the social element of the highest importance is that of race. Thus, for example, Morselli writes: "Even in the matter of suicides we find that the zone of frequency corresponds to countries inhabited by peoples differing in religion, culture, and in political constitution,

[1] Cf. de Gobineau, *L'inégalité des races*, Paris, 1894; L. Gumplowicz, *Der Rassenkampf*, Gratz, 1883; Lazare, *L'antisemitisme*, Paris, 1895.

but kindred by race."[1] And Sergi declares that, "If we seek an ex-"planation of the origin of civilisation, and of the dominant Aryan "people, along the Mediterranean as well as in central Europe, we "shall find up to a few years ago, in the minds of all archæolo-"gists, linguists, and anthropologists the conviction that Asia was "the unquestioned cradle of the one and the other. The centre "of dispersion of peoples and of civilisation, at least so far as the "primitive ideas of biblical origin are concerned, has been removed "from Mesopotamia to Hindoo Koosh, and Europe becomes an "Asiatic colony into which civilisation has been brought along "with its people."[2]

According to this view civilisation originated in Asia, the cradle of languages and of the Aryan people, the centre of dispersion of the European population. The European people in various groups and in successive times left the common Asiatic centre and established themselves in Europe in their various settlements, carrying with them a common patrimony of languages and civil and religious institutions. There were at first distinct groups, as for instance the Italo-Greeks, the Celts, the Letto-Slavs, the Germans, all of which had formerly belonged to the Indo-Iranian people—the Asiatic group. The Aryans are supposed to have invaded Europe from the east and the west, from the north and the south.

Thus even from the first civilisation was supposed to be due to the superiority of a single race. This race, according to the view here outlined, was the Germanic, and civilisation, including the Greek and Roman, to say nothing of the other successive civilisations, was due to Germanic invasions. Huxley declares that even in historic times the area occupied by the fair races with elongated skulls and speaking the Aryan language, was at least for a time continuous from the northern sea coast to central Asia.

It is a fact, however, that the Germanic type is not encountered in any of these regions except in a very limited number. The chief

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[1] E. Morselli, *Il suicidio*, Milano, 1879, p. 158.

[2] G. Sergi, *Origine e diffusiône della stirpe della Mediterranea*, Roma, 1895, p. 3; Isaac Taylor, *Origin of the Aryans*, French translation, Paris, 1895.

characteristics of the Germanic type have always been recognised as fair complexion, tall stature, blue eyes, and elongated skulls. The purest example of this type is found in southern Scandinavia. Now the contents of numerous graves in Scandinavia show that, so far as archæology has investigated the so-called neolithic age, the great majority of inhabitants had the same structure, and the same cranial peculiarities as at present. Near the graves of men of this tall race, fair and with long skulls, are found men with wide skulls, that is, with skulls of a greater width, often much greater, sometimes four-fifths of the length. This fact was indeed recognised by Professor Huxley, who, as we have just seen, was deluded by the mirage of the Indo-Germanic theory. He writes that in whatever direction we traverse the interior of continental Europe now occupied by a fair race with elongated skulls, let it be through the Southwest, southern France, across the provinces of Belgium into eastern France, in Switzerland, in southern Germany, in Tyrol, or to the northeast into Poland and Russia, or north into Finland and Lapland, wide skulls appear frequently among the elongated. We find among persons who typically have wide skulls, as for instance the Swedes and the Germans, those with elongated skulls. As a general rule in France, in Belgium, in Switzerland, and in southern Germany the increase in the number of wide skulls is accompanied by the appearance of an always increasing proportion of men of dark complexion and low stature. Even in central France and from that point toward the east among the Cévennes and the Alps of Dauphiné, of Savoy and of Tremont, to the western plains of northern Italy, the tall, fair race, with elongated skulls practically disappears and is replaced by a dark race with wide skulls.[1] But this mixed type, which Huxley recognises among people which more particularly inhabit the so-called basin of the Mediterranean, must also be recognised among the Germans. Several years ago a German writer, Dr. Welcher, more impartial than some of his kinsmen have shown themselves in this question, wrote: "The modern Germans are in part brachycephalic, in part artocephalic, never

[1] *Nineteenth Century*, 1890.

dolichocephalic"; and he continues: "If the primitive Germanic people were dolichocephalic, it must be said that an insignificant number of modern Germans of Germanic stock are found to-day in Germany."[1] As to color, in all the German empire, according to the statistics of Virchow, the fair are on the average 31.8 per cent., the dark 14.05 per cent., while the mixed type reaches 54.15 per cent. In northern Germany itself the number of persons with dark complexions varies from 12.1 per cent. to 6.9 per cent. A really genuine fair race, then, does not exist. If the primitive Aryans were all fair, as the advocates of the Germanic theory maintain, it must be recognised that instead of having imposed their civilisation on all Europe, they have been the conquered race. Pösche, one of the most rabid advocates of the Germanic theory, writes: "The ancient, fair, Indo-Germanic people attacked the Finns, overcame them, and carried away tens of thousands of them as prisoners, reduced them to slavery, and little by little incorporated them."[2] So, according to Pösche, Penka, Huxley, and others, the fair, purely Germanic race, came into Greece and Italy, conquered the primitive dark races and gave to them the Aryan language and civilisation. Thus Huxley writes: "The ancient Thracians were proverbially a people with blue eyes and fair hair. Fair people were common among the ancient Greeks, who were a people with elongated skulls."[3] On the other hand, Sergi has shown very clearly that "in Homer no divinity is fair in the ethnographic signification of the term. Only Achilles and Rhadamanthus can be considered fair."[4] If civilisation was truly born with a fair race, why did it not develop in Germany? This question, obvious as it is, does not seem to have presented itself to the mind of the Indo-Germanic theorists. And yet Taylor[5] considers this as one of the principal reasons which may be advanced against the pretended Asiatic origin of the Ary-

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[1] See besides the volume of Sergi already cited, Welcher, *Ueber Wachsthum und Bau des menschlichen Schädels*, Leipzig, 1862, p. 65; Moschen, "I caratteri fisici e le origini dei trentini" in the *Archivio per L'Antropologia*, Florence, 1892.

[2] Th. Pösche, *Die Arier*, Jena, 1878; L. Penka, *Die Herkunft der Arier*, Vienna, 1886.

[3] Huxley, *op. cit.* [4] G. Sergi, *op. cit.* [5] I. Taylor, *op. cit.*

ans. He says that if the Aryans originated in Asia, how comes it that they developed their civilisation in Europe? This question was also proposed earlier by Latham.

Since the evidences of a fair race diminish from north to south, it seems that to develop the various civilisations it must have made a leap, not only into the valley of the Euphrates and the Tigris, and into the valley of the Nile, but also into Greece and Rome. Now, no legend of any of these peoples attributes the rise of civilisation to a northern divinity. Only one legend of this kind, so far as the writer knows, exists. That was found among the people of Chili at the time of its discovery. But unfortunately for the defenders of the Indo-Germanic theory, this legend does not serve in any way to substantiate that theory. Schopenhauer said: "Scratch a German, and you discover a metaphysician," but so far as this theory is concerned, it is not even necessary to scratch it. Its true nature is visible on the surface. It is pure theory unsupported by facts.

II.

Race is the name of a subdivision of one of those groups of living beings which, in the technical language of Zoölogy and Botany, is called a species, and the term denotes the possession of characteristics distinct from those of other members of the species, which have a strong tendency to manifest themselves in the progeny of all the members of the race. These characteristics of race may be physical or intellectual, but in practice the latter, being less susceptible of observation and of definition, can rarely be seized upon and examined. Now, it is a fact that while we frequently speak of race and define what we mean by it, yet in practice it is almost absolutely impossible to make any distinction that will hold. The only element at all reliable which presents itself for anthropological classification is the form of the skull. As to color, it varies widely among the same people. The same may be said of stature. If language is taken as the basis of classification, the results obtained are even less trustworthy.

We continually hear of the Israelitish race. It is spoken of as the most homogeneous of races, and the most refractory. But it is

strongly diverse. Anthropologists are accustomed to divide it into two parts well distinguished—the dolichocephalic and the brachycephalic. To the first type belong the Sephardim Jews, the Spanish and Portuguese Jews, even the larger part of the Jews of Italy and southern France. To the second belong the Askenazim Jews, that is to say, the Polish Russian, and German Jews.[1] In Africa we find agricultural and nomadic Jews allied to the Kabyles and to the Berbers near Setif, from Guelma, and Biskra to the frontiers of Morocco. They travel in caravans to Timbuctoo, and some of their tribes upon the confines of the Sahara are black,[2] as for instance the Daggatomis, as are also the Falachas Jews of Abyssinia.[3] In India white Jews are found in Bombay, and black Jews in Cochin. As to the Jews in China, they are not only allied to the Chinese who surround them, but they have even adopted their customs and the religion of Confucius.[4] It is well known that in Italy they speak Italian, as in France they speak French, and in Germany German. A language is learned and spoken by two peoples which have no other point of contact.

If the cranial form is taken as the basis of classification, the results are no better. Thus Sergi sees in the population along the Mediterranean, a race quite distinct from all others, with cranial features quite unique. But the principal cranial forms along the Mediterranean are at least ten, and besides there is a great number with differences more or less marked. The latter being found less frequently than the former, the famous anthropologist considers them foreign to the race, or the result of crossing. But it is evident that this classification is too generic, not being based upon a single cranial form, and it becomes still more so with this crossing.

The fact is there are true and real lines of continuity between one race and another, so that a precise classification is not possible. Even if this anthropological classification were exact, it could not have any sociological importance. For no well-determined causal

[1] C. Lombroso, *L'antisemitismo*, Turin, 1894; Lazare, *op. cit.*,

[2] Mardochée Aby Serour, *Les Daggatomis*, Paris, 1880.

[3] Cf. d'Abbadie, *Nouvelles annales des voyages*, 1845, Vol. III.; Lazare, *op. cit.*

[4] E. Schwartz, *Le peuple de dieu en Chine*, Strassburg, 1880.

relation has yet been shown between the form of the skull and the intellectual development of individuals. Not only this, but of two peoples belonging to the same ethnographic branch one makes enormous progress, while the other remains stationary, as for instance the Chinese and the Japanese. The Japanese ethnographically belong to the same race as the Chinese. They have assimilated, it is true, a few small foreign groups, but these are of too little importance to be regarded as the true cause of the modification of the Japanese character. While we have seen the Chinese struggling bitterly against European civilisation, the Japanese with an enviable eagerness have sought to assimilate as much of it as possible. The English waited two years before accepting the metric system, but the Japanese accepted it as soon as they understood its utility. An enormous waste of time, a true *gaspillage*, was produced by the use of their alphabet. In spite of their intense national spirit, strengthened by recent victories, they have already decided to abandon it for the European. The Germans even yet hold to their caligraphy, and wish to continue it. Only in commerce has it begun to fall into disuse. The Kabyles, in northern Africa, are a people as energetic and industrious as the Tonareg are obstinately nomadic. Nevertheless the Tonareg and the Kabyles belong to the same race, and speak almost the same language.[1]

At the end of the fourteenth century could anybody in the world have predicted the commercial and industrial development which has since taken place in England? At that time it was a people of peasants and of soldiers who had shown their bravery in the Hundred Years' War. Originally the English not only had no inclination toward commerce, but were sluggish and preferred to remain in their villages. Even now they call a voyage, *travel*, and to make a voyage has become *to travel*, in consideration no doubt of the trouble which a voyage gave them, and the effort required to make it.[2]

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[1] N. Schirmer, *Sahara*, Chap. XIV.; G. Brissier, *L'Afrique romaine*, *Ch.* IV.

[2] A. Marshall, *Principles of Economics*, Vol. I., Bk. 1, Chap. 3.; F. S. Nitti, *Il Lavoro*, p. 9.

We may affirm that the intellectual development of an ethnographic race is not only very diverse, but is modified and developed by causes quite foreign to the action of other races. The assumption then, as the anthropologists almost unanimously affirm, that European civilisation has come from one race, is entirely gratuitous. Our historic memory covers so small a space of time that we can obtain from it very small assistance. Even in a period so recent as 1500 years before Christ, northern Eurasia lay in historic darkness, with the exception of a ray of light thrown upon it by Egyptian and Babylonian literature. The many interesting discoveries brought to light by the extended researches of the last ten years into the primitive history of the human race has placed beyond doubt one important fact (a fact for a long time probable on account of other reasons) that the existence of the human race reaches back at least twenty thousand years. Haeckel, a competent authority, although he frequently makes very bold assertions, thinks that the existence of the human race reaches back to more than a hundred thousand years.[1] As it may have been many hundreds of thousands of years, it appears comical that even to-day our calendar places the creation of the world, according to Calvitius at five thousand eight hundred years ago. In any case, man lived as such in Europe during the diluvial epoch along with many great mammals long since extinct—as for instance the diluvial elephant or mammoth (*Elephas primigenius*), the woolly rhinoceros (*Rhinoceros tichorhinus*), the gigantic deer (*Cervus enrycenros*), the cave bear (*Ursus spelæus*) the cave hyena (*Hyena spelæa*), the cave tiger (*Felis spelæa*), etc. The results obtained from putting in the light of modern geology and archæology the fossil remains of men of the diluvial age and of contemporaneous animals are of the highest interest.[2] The theory of a centre of diffusion of the human race is not only hypothetical, but unscientific. Yet into this grave contra-

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[1] E. Haeckel, *Schöpfungsgeschichte*, Italian translation, ed. 1892, Ch. 20.

[2] Cf. C. Lyell, *The Geological Evidences of the Antiquity of Man*, London, 1869; J. Lubbock, *Prehistoric Times*, Italian translation, Turin, 1878; L. Büchner, *Der Mensch und seine Stellung in der Natur*, Leipzig, 1872; P. Topinard, *L'anthropologie*, Paris, 1888.

diction Haeckel himself falls. While he recognises the ancient origin of the human race, he imagines a special country called by the English writer Schrader, Lemuria, which he thinks must have been the centre of the dispersion of the various human races. Lemuria was a continent at the south of Asia, which has long since disappeared.

As gratuitous as the theory just criticised seems to me also that of my illustrious friend, Professor Sergi of the University of Rome. He admits a race and a civilisation in the basin of the Mediterranean, which arose independently of any foreign influence whatever, eastern or northern. He distinguishes in this locality four principal and complex branches—the Iberians, Ligurians, Pelasgians, and Libyans. The centre of dispersion of this race he thinks was central Africa. While he declares that the cranial form has not varied from its original form, he does not tell us why in the same place four branches of a single race have originated, and not one only. He admits that the clear brown of the Egyptians was always such, and not a bleaching of the dark brown of the Africans.

But whence comes the much clearer skin of the Mediterranean peoples? The Pelasgians, for example, might have been an anterior mixed population like the occidental Gauls and the Britons before the Teutonic invasion.

Professor Otto Helm in the accurate researches which he has carried on for more than twelve years, has collected from eastern Prussia many objects made of bronze and other alloys of copper and belonging to a very ancient prehistoric epoch. Chemical analysis shows that these objects contain 3.87 per cent. of antimony, but the bronzes of Hungary are the only ones in which this metal is found in that proportion. Then with Helm we must conclude that the prehistoric bronzes of eastern Prussia are of Hungarian origin. On the other hand, in Hungary many objects made of yellow amber have been found. These must necessarily have been imported from the Baltic. These facts, with other numerous evidences, lead us to the conclusion that relations must have existed even from the most ancient times between the inhabitants of the shores of the Black Sea, the Adriatic Sea, and the Baltic. These relations were en-

couraged by the presence of the Vistula, but who is able to say with scientific seriousness that the people of these three regions were one, and that they went into foreign countries to exchange those objects which we now find scattered.

The same observation may be made in regard to the distribution of skulls in the different regions. Sergi has found in the skulls of the Museum of Mona the Mediterranean forms and the forms of Egypt and Ethiopia, and writes: "I saw again the beautiful pentagonal forms, the elliptical and the ovoidal forms with those characters peculiar to the Mediterranean, and I saw the secondary forms which are mingled with the first from the remotest times in the various migrations of peoples, and from this fact I had the conviction, which I here repeat, that the first colonies came from southern Russia to the Mediterranean."[1] Sergi does not consider the opinion of Schrader, who reaches a conclusion directly opposite to his own, to be of any value. Schrader holds that the seat of the primitive Aryan people was European Russia.[2] So the region which according to Sergi is the limit of the diffusion of the Mediterranean race is according to Schrader the beginning of it. We may then conclude that one can never say with certainty whether people with a given cranial form are the invaders or the conquered.[3]

The zoölogic process according to Darwin is imagined as a tree. He shows how the many branches of this tree appear, increase in size, and remain, but his doctrine does not go beyond the roots, nor does it reach above the branches. This is true as it is applied to the human races. Even in pushing our investigations to the remotest prehistoric epochs we find diverse races in contact

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[1] Sergi, *op. cit.*, p. 87.

[2] Schrader, *Prehistoric Antiquities of the Aryan Peoples*, translated by Jevons, London, 1870.

[3] Sergi starts out with the following assumption: "Wherever a race-stock is found always predominating, there should be found the hearthstone of civilisation. On the other hand, wherever is found a race-stock with its physical characteristics and its products in the midst of other race-stocks later become predominant, there should be found transformations and super-positions of racestocks and of products." Now, this law cannot be depended upon. Novicow (*Les luttes entre sociétés humaines*, Paris, 1894) finds many facts which contradict it. Some of these I have pointed out in a pamphlet on *La question sicilienne en Italie*, Paris, 1895.

with each other without its being possible to make any precise distinction, and without our being able to attribute civilisation to one race rather than to another. France has had periods of great prosperity, and these have alternated with those of decadence, but Alfred Fouillée[1] has shown that the true historic tradition of this country remained constant even when Gaul became France.

In Europe the Italians occupied a position more elevated than the Spaniards, but this is not the case in Argentina, in spite of the fact that the Italians there number 892,992, while the number of the Spaniards is only 254,527. The Spaniards of Argentina are superior also to the French, who number 145,785; and it is the prior emigration of the Spaniards, a fact entirely fortuitous, that decided the social economic direction of Argentina, in spite of the fact that the French and Italian races are superior to the Spanish.

The civilisations of different peoples are developed almost without any relation to their race. Civilisation passed from the south to the north in Europe without having caused any displacement of races. If one should attribute the fall of the Roman Empire to invasions of a few tens of thousands of savages, one attributes too great an effect to so small a cause. The decay of the Roman Empire began long before the influence of any foreign race was exerted. In the fourteenth century Venice was the greatest commercial city in Europe. Now it has become a port of the fifth rank. The port of Venice is not sufficiently deep for modern ships, and commerce has taken another direction. All this has had little to do with race.

The social phenomenon of civilisation is almost completely independent of the anthropological phenomenon of race. At least up to date no serious relation scientifically tenable has been established between these two phenomena.

III.

It is said by some that the human constitution is less passive and plastic than it used to be (Peschel, Meyer, Hellwald, Waitz).

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[1] A. Fouillée, *L'idée moderne du droit*, Paris, p. 76.

Since we are completely ignorant of the original race stock, that assertion is absolutely gratuitous. Others maintain that the tendency to unity is caused by historic and social factors,[1] but we shall soon see that the action of these is opposed to unity.

The actual current which is carrying us towards international unity is not independent of the immense variety of physical environment which is assisting to-day in the formation of new races. In the United States one may observe the process of the modification of the Anglo-Saxon character. Out of the difficulties of colonial life and the struggle with primitive nature a new type has been born, and yet the relations between England and the United States are very close. A large English emigration crosses the Atlantic every year and spreads itself over the Union. If Montesquieu had been questioned in regard to this fact, he would probably have responded with the phrase with which he begins the book which cost him twenty years of thought and elaboration, "Laws in their most extended signification are necessary relations derived from the nature of things. In this sense all beings have their laws."[2] He would make the same reply to those who should ask why Italy and Spain are agricultural while England occupies the first rank in the metal industries. There are natural laws which make the difference between an Englishman and an Italian or a Spaniard. There is in Ausner[3] a table of statistics of criminality by sexes in nineteen of the most important countries of Europe. "Wherever industry and commerce predominate, criminality among women sensibly increases." By heredity this criminality becomes a characteristic of a new race, and so with all other physical and moral characteristics. In this way is formed, to use the expression of M. Le Bon, "an Historic Race."[4]

It is easy to understand that the sociological value of an his-

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[1] N. Colajanni, *Sociologia Criminale*, Vol. II., p. 286. On this subject see my work on *La question sicilienne et Italie*, p. 45 et seq.

[2] Montesquieu, *Esprit des lois*, Ch. 1.

[3] Ausner, *Vergleichende Statistik von Europa*, Berlin, 1865.

[4] G. Le Bon, *Les lois psychologiques de l'évolution des peuples*, Paris, 1894, pp. 45–52.

toric race is entirely different from that of a true ethnographic race in its anthropological signification. This much is clear, the natural conditions of the environment exercise upon individuals more or less influence. Adaptation to environment is one of the principal supports of the Darwinian theory. But this theory does not carry with it the idea that among historic races there has been a conflict.

What are the conditions of the natural environment which develop identical conditions in the individuals which inhabit it? It is absolutely impossible to say in what one natural environment differs from another. The natural environment is constituted by a complexity of circumstances, some apparent, others imperceptible, of which it is impossible to declare what the effects will be.

Ferdinand Gregorovius on the 2nd of October 1870 writes from Karlsruhe of the tremendous impression which Strassburg made upon him. He is carried away by the magnificent view from the top of the Cathedral. "From this point," says he, "one may see that Alsace naturally belongs to Germany, for the Rhine melts away in the distance without making any natural boundary. Along its banks are the Vosges and the Black Forest."[1] Now, this statement of Gregorovius is simply absurd. What is the visible indication of a termination of the natural conditions of Germany and the beginning of the French territory? He does not say, and I could not undertake to do so without making myself appear ridiculous.

The various natural environments form a gradation that never makes a leap nor leaves a hiatus, and it is just so with populations. In Scotland we hear of Highlanders and Lowlanders, that is, inhabitants of the Highlands and inhabitants of the Lowlands, but who will say that they constitute two quite distinct social types? On the contrary, the line of continuity is perfect. As a general principle, therefore, we may affirm that peoples inhabiting contiguous regions and yet presenting quite different ethnographic characteristics are quite rare.

Fouillée is right when he says, "The falsifiers of history, so numerous beyond the Rhine, have represented as a struggle of races

[1] F. Gregorovius, *Diari Romani*, 1895, p. 454.

the fratricidal war of France and Germany, two countries really alike in ethnic composition."[1]

The same thing has been done with the wars between the French and the Italians. The following table shows the increase of foreigners in France:

Year	Native French	Naturalised	Aliens of all Nationalities Number	Per Cent.
1851	35,388,814	13,525	379,289	1.06
1861	36,864,673	15,259	509,381	1.35
1866	37,415,283	16,286	655,036	1.72
1872	35,346,695	15,303	740,688	2.03
1876	36,069,524	34,510	801,754	2.17
1881	26,327,154	77,046	1,001,090	2.64
1886	36,700,342	103,886	1,126,531	2.97
1891	36,832,470	170,704	1,130,211	2.97

In the last census of the French population, the Italians numbered about three hundred thousand. Now could it be asserted that the violence exercised by the French laborers against the Italian laborers was an illustration of a struggle of races? That would be a false assertion. The French laborer is frequently suspicious of the Italians solely because they are willing to accept a smaller wage and therefore increase competition. Now if we are to take the fact that the laborers of the one race are contented with a lower wage than those of the other as a distinction, I do not know what is meant by race.

A similar phenomenon may be observed among laborers of the same race in the usual sense of the word. In the case of a strike, it does not matter whether it is declared for an increase in salary or to prevent its diminution, whether it is desired to prevent a scaling of wages, or to secure an increase, all the laborers are not likely to be of one opinion. Some will accept lower wages, or do without the increase, being almost indifferent to the result. These laborers may refuse to take part in the strike and may wish to remain at work. Who is not familiar with the tyranny of striking laborers

[1] A. Fouillée, "Le caractère des races humaines et l'avenir de la race blanche" in the *Revue des deux mondes* July, 1895.

against those who are disposed to work? Must we therefore conclude that they belong to a different race?

In the Middle Ages the Israelites clothed themselves in a special color, in general yellow, but the Christians in forcing them to do this never thought of race distinctions. They simply satisfied their religious prejudices. There are many cases of conversions of large numbers of the Israelites. All the Israelites of Braine, of Tartose, and of Clermont were converted about the same time through the efforts of Avitus. Vincenzo Ferrero baptised twenty-five thousand of them at once. After the Council of Toledo, which prohibited mixed marriages, many of the Israelites were converted. With the change of their religion, the persecution of the Christians ceased? Must we then conclude that they changed also their race? How absurd! The entire dress which the Israelites wore in the Middle Ages was due to a spirit of exclusiveness, a spirit of false Chauvinism, which the Christian persecutions gave rise to. These artificial distinctions were used in the absence of any real difference between the races.

Language, like religion, is a distinction of quite secondary ethnological importance. After an individual has remained a long time in a country, he usually learns its language and its customs. And yet the Italian colony in France is made up chiefly of emigrants more or less transient who scarcely ever learn to speak the language of the country they inhabit. But the Italian laborers are contented with very low wages. They, therefore, compete with French laborers and thus tend to lower their wages. But in Austria where there are, according to the last census, about forty-six thousand Italians, almost all laborers,[1] the wages of the Austrian laborer are no higher than those of the Italian, hence between the two there arises no serious competition. There is, however, the same difference of language. In France the union of native laborers against the Italian is not on account of any antagonism of race, but solely an economic phenomenon. The same thing does not happen in Austria because there is no antagonism. In France the Italian language

[1] Cf., *Le monde économique*, July 28, 1895.

has become almost a mark of distinction of the laborers accepting a low wage. "In India," says Ibbetson, "similarity of food is employed as an exterior sign of community of blood."[1] Now, what would be said of an ethnographic classification of Indian races based upon eating? Language is no better, for it is only an external characteristic of no intellectual or physiological importance. If it were taken as the principal distinction of the various races, it would have to be admitted that the people who speak the modern Romance languages are not Latin,—but that would be absurd. Frederick Müller, taking language as the distinguishing feature of human races, is not able in his ethnography to avoid a classification entirely empirical. He forgets that an inferior people may learn a language, and history shows abundant incidents of the transmission of language from one race to another. "There is no proof," says Huxley, "for asserting the incapacity of a race to substitute another language for its own. Physical, moral, and mental peculiarities are transmitted with blood and not with language. In the United States the negroes have spoken English for generations, but nobody would call them English, or expect to find them different physically, mentally, or morally from other negroes."[2]

By the foregoing illustrations we see how various are the distinctions made by different authors between the races: the color of the skin, form of the skull, religion, language, even a cross-section of the hair. If this section is oval in one individual, and in another round, lo! the two individuals belong to two different races.

Now, if the characteristics of race are so uncertain, how can we say that there has been a conflict of races? The expression "conflict of races" implies that all individuals belonging to the same race are united, or at least cohere for reacting against those of another group, that is of another race. Laumonier writes: "Six or seven races have united to form the French nationality, as many

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[1] Cf., E. Seuart, "Les castes dans l'Inde" in the *Revue des deux mondes*, Sept. 15, 1891.

[2] Cf. on this point the work of Huxley already cited, Taylor (*Origin of the Aryans*, London, 1890), and the *Pall Mall Gazette*, January, 1870.

the German, more yet the Italian."[1] And Novicow says: "There is not a single country in the world which has been peopled by one race autochthonous and pure."[2] Sergi says: "I have found in various parts of Italy skulls so small, although normal in anatomical constitution, that I have called them microcephalous. I found the same in Malaysia, among the Kurgani in Russia, and in ancient cemeteries, and among the skulls along the Mediterranean which are said to be those of the Phœnicians. The types or forms of these craniums are very different from those of the people who form the main race-stock, and frequently present marks of inferiority of structure. Many, even all, that I measured and considered as belonging to the pigmy stock were inferior in cranial capacity to the Negrito or Oriental pigmies. The study of the population of Italy in regard to stature confirms my investigations concerning the existence of a pigmy population, a fact also supported by the small capacity of some skulls. I find that in the male population of twenty years of age there are 1.63 per cent. from 1.25 meters to 1.45 meters, and 14.49 per cent. from 1.25 meters to 1.55 meters. Taking the whole population male and female, estimated at 30,000,000, we have measuring 1.25 meters to 1.45 meters, 978,000 pigmies, male and female; 1.25 meters to 1.55 meters, 4,347,000,—an enormous number out of a population of 30,000,000.[3] Now, it is a fact of great importance that a race which in respect to another is not only physiologically and intellectually inferior, but inferior also in numbers, is able to live and prosper alongside of it. Then what becomes of this theory of the conflict of races? If, after so many centuries, it has not affected the selection of an inferior race, that means that even if races do exist, a conflict of races does not.

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[1] Laumonier, *La nationalité française*, Paris, 1889, p. 53.

[2] J. Novicow, *Les luttes entre sociétés humaines*, Paris, 1890, p. 241.

"Unity is lacking, races have been divided, scattered, mingled, crossed in various proportions, and in every direction, through many centuries. The principal groups have disappeared, their places have been taken, not by races, but by peoples."—P. Topinard, *op. cit.*

[3] G. Sergi, *op. cit.*, p. 90; "Le varieta humaine" in the *Atte della società Romana d'Antropologia*, 1893.

IV.

Malon thinks he recognises in a strike one of the gravest manifestations of the conflict of classes. Well, on the 25th of August, the political journals of Paris published the following telegram: "The related industries have united with the striking glass-blowers "of Carmaux. Workmen in the industries related to glass-blowing "have pledged themselves not to resume work until the glass-blow-"ers are taken back. They have thus united themselves into a "single body comprising twelve hundred men. The strike quietly "continues, and will be maintained while the strikers receive assist-"ance. This has been voted by several councils, general and "municipal." On the same day the following telegram was sent from Pisa: "The women weavers of the Nissim factory have struck, "making common cause with a clerk of the establishment. The "clerk was aggrieved on account of the fact that privileges which "he thought due to him were withheld, etc." These two strikes taken at random perfectly illustrate what we wish to show. Notice that at Carmaux the strikers were at first a single class, namely, the glass-blowers. These were joined by the workmen of related industries. At Pisa the strike was begun by a clerk.

It is well known that the land-holders, especially in Germany, are strengthened by the support of the peasants. The land-holders persuade these poor people that a rise in the tariff on foreign cereals brings with it a rise in their wages, and so the proprietors and the peasants unite to obtain privileges in favor of agriculture. These have to struggle with another class, namely the manufacturers, whose interests are frequently opposed to those of the land-holders. But these two classes unite in a conflict with a third class, namely the consumers, who do not wish to be despoiled by any advantage gained by the other two. Thus it may be seen that often the same individual at the same time is engaged in the struggle of two different classes. Indeed the chief characteristic of modern social classes is their unstable composition.

In the Middle Ages classes were firmly established. Individ-

uals practising the same profession formed a well-defined corporation. Each member knew his rights and duties. Not only that, but the transmission of a profession from father to son was made with greater regularity than it is to-day. In addition to the excessive favors accorded to some of these corporations whereby they were able to despoil all below them, they were useful to their members. The market being limited, the need of a regular production was rendered necessary. This in fact was always fixed. Thus the corporation obtained a perfect regularity in economic production, and served a purpose.

On account of a complexity of circumstances which has enormously developed the economic market and economic production, the utility of the classes and corporations of earlier times has disappeared. When in modern times they attempt to reconstitute themselves their true scope is social spoliation. That which individuals acting alone cannot obtain they attempt to secure by united effort and by the force of numbers.

The following may serve as an example. The Midland miners in England some time ago, threatened a great strike. Lord Rosebery intervened, and formed a council presided over by Lord Stand, by which it was sought to bring the miners and the employers into accord. As a result, the minimum of wages was raised thirty per cent. over the wages of 1888. Mr. Emerson Bainbridge, President of the Company at Unstone, who works among others the mines of Drousfield in Yorkshire, had to close up these mines. By the increase of salary which he was obliged to give to his workmen, his profits, already low in the mining industry, were converted into a loss. Mr. Emerson Bainbridge would never have consented freely to an increase in the wages of his workmen because he simply could not do so. He was forced to it by the union of the workmen, with the result that the work itself was stopped. The pretended conflict of classes is then an effort to secure by the brute force of numbers that which single individuals acting freely could not obtain. This, beyond a doubt, is illegal and unjust. If X goes to Y and demands his pocket-book, Y will certainly refuse to give it up. Then X proposes to K, to L, etc., that they unite with him in de-

manding the pocket-book of Y. Y, now being confronted by several persons can no longer refuse as he did before, and consequently surrenders his property. Now the association of X, K, L, etc., to secure the pocket-book of Y, we call an association of robbers. By the brute force of numbers they secure that which individually they could not have obtained. It is just the same in this pretended conflict of classes. A certain number of laborers unite to secure higher wages, which the condition of the market will not allow, and which otherwise acting freely they could not obtain. Sometimes they unite to impede the work of women, even those belonging to the same class, because they are laborers. I have recently seen that in Rome the carpenters, in order to prevent the employment of laborers from a neighboring city who enter into competition with them, have formed an association. Even this has the bare-faced effrontery to call itself a conflict of classes. Conflict of classes is an expression which is meant to signify collective action which tends to repair certain social injustices. It is very clear, however, that under this name attempts are made to commit the gravest social wrongs.

V.

The individual strives to obtain the greatest possible amount of wealth. His welfare depends upon the satisfaction of his needs, which satisfaction is procured by that which generically is called wealth, or goods. Individual actions are exerted to obtain the greatest possible quantity of wealth in order to satisfy the greatest possible number of needs. By the capture of women the family was constituted, first under the polygamic form, then after a slow evolution under the monogamic. The primitive bond of the family, Novicow concludes with Starcke, issues from the right of property.[1] To the same effect Giraud-Teuton writes: "Love between father "and child appears to be a conquest of civilisation, rather than a "permanent phenomenon of the natural history of the human race, "and the sentiment of paternity destined to become so elevated

[1] J. Novicow, *op. cit.*, p. 71; C. N. Starcke, *La famille primitive*, Paris, 1891, p. 271; Westermarck, *Les origines du mariage humaine*, French translation, 1895.

"had an interesting origin. The first relations between father "and son that one remarks among barbarous peoples are those of "master and slave. Their relations are not determined by reciprocal "love, nor by conscious ethnic principles, but only by the move-"ment of selfish interest, and they rest chiefly upon brute force or "physical superiority."[1] Even to-day among the lower classes, is not a male child, on account of his being more profitable as a laborer, preferred to a female? Among the higher classes, a son is eagerly desired on account of the "pride of name." This pride of name as well as the economic materialism of the less prosperous classes which causes them to prefer the male child to the female, are manifestations under different forms of that early egoism which determined the formation of the family.

The social institution of the family, like everything else which continues to exist, is explained by a reason essentially utilitarian.[2] This much is clear: If man had not always been essentially selfish, the human species could not have survived. For man selfishness is a duty arising from the law of individual preservation. Human selfishness looks out for number one, but it has undergone a continuous evolution. From blind selfishness, truly animal, which sees in things only their immediate utility, man has passed to a selfishness more and more refined and clear-sighted, so that immediate utility is frequently sacrificed in favor of a superior deferred utility.

So then if society instead of being useful for the preservation of the individual had been disadvantageous, it would never have existed. Unconsciously the individual has conformed to society in order to satisfy in the best manner his needs.

The idea of Wallace, who supposes that human evolution has followed a mysterious direction exercised by a superior intelligence by means of agencies more subtile than any with which we are acquainted, is perfectly silly.[3] Morselli justly and acutely observes

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[1] Giraud-Teuton, *Les origines du mariage et de la famille*, Paris, 1884, p. 432; G. Vadata-Papale, *Inconscio e conscio nel processo evolutivo della vita sociale e del diritto*, Bologna, 1895, p. 48.

[2] See especially Spencer's *Principles of Sociology*.

[3] A. R. Wallace, *Essay on Natural Selection*, London, 1889; *Darwinism*, London, 1889.

that Wallace is a convinced Spiritualist, and that his hypothesis is far removed from the scientific sphere. But this is not the place to discuss it, even if it were thought worthy of examination.[1]

The same may be said of the theory of Hartmann. It is an unscientific hypothesis, an attempt to explain facts not by other facts and laws, but by mysterious, unverifiable and inefficient causes. For what is the use of an unheeding deity to govern the world and human society, if the actions of individuals and their mutual relations to their environment are sufficient to explain everything.[2] Individuals in relation to the environment in which they live, seek to appropriate from it the greatest possible quantity of energy. For this purpose they unite their efforts in various ways and thus determine that enormous complexity of relations which are called social.

Social relations find their basis and their *raison d'être* in the individual, but when individualism is pushed to the extreme of Max Stirner, of Frederic Nietzsche, or R. Schellwein it is unsustainable. "*Ich singe, weil ich ein Sänger bin. Euch aber gebrauche ich daher, weil ich Ohren brauche.—Ich hab' mein Sach' auf Nichts gestellt.*" Or as another writer says: "The ego, the single existing individual man, is the only thing. Outside of myself, there is nothing. The ego, as religion affirms of deity, is inexpressible, and it is perfect since it is at every moment all that it can be. More it cannot be, nor has it need of being. Every other being or thing is my property in so far as I have the power to appropriate it, and in so far as I wish it." Now this is blind individualism.

As a matter of fact, the individual finds it useful to associate his efforts with those of other individuals in order that he may obtain in the labor of production a greater quantity of goods. The comfort of the Parisian as contrasted with the poverty of the Hottentot or the Kaffir is due precisely to a complicated series of associations of effort, and to the division of labor, both of which have been

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[1] E. Morselli, *L'antropologia*, Turin, 1889–1895, p. 399.

[2] Cf. A. Fouillée, *La science sociale contemporaine*, Paris, 1880, p. 198; G. Vadata-Papale, *op. cit.*, p. 8.

slowly developing. How many victims are scattered along the highway of social progress! How many times this way has been missed, and how many efforts have been made before finding it! All this labor, inconceivable on account of the number of centuries it has been carried on, has had one single motive in its unwearying and unceasing application—the need of increasing individual welfare. If all this labor had been due to a single individual, or even to a single family-stock which had continued through the centuries, the present result could never have been obtained. Modern civilisation would never have begun.

But people have been in contact with each other from the remotest epochs. In this contact one people has taken from another the useful knowledge which it had discovered, and *vice versa*. By other people there has been a continual storing up of useful knowledge, so that their amount has always been increasing. The civilisation and the welfare of every people is in direct proportion to its quantity of useful knowledge.

Now the civilisation which arose along the Mediterranean was not in fact due to this or to that race. It was a result of natural geographic conditions. Sergi recognises this when he writes, "The Mediterranean was not only a European Sea. The waters of Europe, Asia, and Africa united to form it, and were the channel of communication and of contact between the three continents of the ancient world."[1] "The superiority of the white race," says Sereix, following Quatrefages, "is an arbitrary dogma."[2] If it had not occupied the basin of the Mediterranean and united in itself all the useful knowledge which belonged to the three continents of antiquity, the white race would never have been able to give to the world the cosmopolitan civilisation which it has given. That is, it could not have given that civilisation which has been the mother of all others, even our own. This is aside from the influence which natural conditions have exercised upon the character of individuals.

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[1] G. Sergi, *op. cit.*, p. 41.

[2] Rafael Alvarez Sereix, *Fechos prehistoricas y Porvenir de las Razos*, Madrid, 1895. In this book the influence of geographic conditions on the development of civilisation is very well set forth.

Why is the German more of an idealist than the inhabitants of the Mediterranean basin? If we exclude the different influences which the conditions of a natural environment exercised upon the development of the two characters, I do not know where we should go to find any other cause.

Grossi is in accord with Courtenay in writing that the modern character of the South American is a result of the mixture of the European and the Indian character, with a predominance of the apathy of the latter.[1] That is very true, and it is quite natural. Indian apathy can only be explained by climatic conditions. Now can it be admitted that these climatic conditions have exercised no influence upon the immigrants of South America? There are three factors,—the character of the Indians, the superiority of the Europeans, and the climatic conditions favorable to a persistence of the Indian character. The combined result of these factors is a change in character with a predominance of the Indian.

So the climatic and meteorological conditions of the Mediterranean basin developed a character in individuals which moved them to feel a lively need of increasing their own welfare.[2] The explanation of this is to be found in the temperate climate, fertility of the soil, and the abundant production. On leaving this favored locality, the deserts of Libya and Syria are encountered, or other regions considered in ancient times inhospitable, as for instance Scythia and the centre of Europe. Even the Euxine sea-coast was called by the ancient Romans inhospitable with respect to Italy in which the centre of its great civilisation was not the valley of the Po, but the central and southern region. The same was true of Greece. Philosophy and the Arts did not flourish in Macedonia.[3]

The very fact of living in contact with other people develops in individuals the needs which they see others satisfying. Here we

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[1] Courtenay de Kalb, "The Social and Political Development of the South American People" in the *Bulletin of the American Geographical Society*, 1894, pp. 1–31; V. Grossi, *Geografia Medica e Colonie*, Rome, 1895, p. 35.

[2] To say of a people that it is very religious and speculative, holding obstinately to tradition, is to say that it is singularly insensible to the joys of action and to the solicitations of material progress. Cf., E. Seuart, *art. cit.*, p. 339.

[3] Cf., Sergi, *op. cit.*, p. 42.

have a splendid illustration of the law of imitation.[1] We see this action even in our own day. The city develops more needs in the individual than the country. That is easily understood. In the city every individual sees others satisfying a greater or less number of needs which have not yet been felt by him. Sooner or later they begin to develop in himself. Needs first arise in a limited number of individuals, a sort of *élite*, and then according to the law of imitation are propagated.

In the city a very strange phenomenon appears. Among manufacturers a need second to none is that of making a profit upon the products of manufacture, and that this profit be as great as possible. So, in endeavoring to satisfy this need, they invent new articles, perfect those already invented, and thus foster a public need for them. Many articles are made even before the need for them arises. A new need always arises out of the necessity of the individual, and is then propagated in accordance with the law of imitation.

But even the spirit of imitation is not sufficient to produce a need when it conflicts with utility. The present writer, for instance, neither smokes nor drinks wine. Here are two needs very much felt in modern society, which in him are negatived by utility. Doubtless he would smoke if cigarettes did not annoy him, or drink wine if it satisfied a need. In his case the idea of utility is stronger than the spirit of imitation, and there is no fear that the contrary could ever be true.

In general, no one feigns a need who suffers by doing so. True, it sometimes happens on account of strong collective suggestion, but only in pathological individuals, and for a short period of time. This, however, is of slight importance. Nothing is more feared by men than death, and yet not a few individuals kill themselves, and eagerly await the moment for doing so. The papers often speak of young people crossed in love who meet death together. From what these persons write after they resolve to die, it appears that they look forward to the day of their death with as much eagerness as if it were their wedding day.

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[1] Cf. the works of Tarde, especially *Les lois de l'imitation*, Paris, ed. 1895.

What Castellar writes in regard to Spain, may be said in regard to all other countries. He writes: "The Spanish people may be divided in a general way into two extreme divisions. First, the cities, for the most part progressive and almost Republican; second, the rural districts, which, owing to the fixity of the daily laborer, he being attached to the soil like a vegetable, as well as to the worship of tradition, are very conservative and reactionary. Every city, on account of its progressive spirit, looks toward the future, but the country, with this spirit of fixity, remains faithful to tradition."[1] This much is plain: if it were possible to put these peasants in contact with new political and social ideas, as it is in the cities, no difference would be found between the two populations. As it is with political and social ideas, so is it with all progressive ideas, economic, moral, etc.

The soldiers of Cromwell had to be stationed at Aberdeen before the inhabitants could learn how to plant cabbages and to make shoes.[2] Just as only a few of the plants and animals found in a civilised country are indigenous, so it is with scientific and industrial discoveries. The majority of them are due to the fact of their having been imported. The more individuals are brought in contact with each other, the more their needs are stimulated and their ideas exchanged, which things taken together urge them to new steps on the highway of social progress.

The United States are rich and highly civilised, not on account of a predominant race, but because their population is a mixture of all the nationalities of the world. Individuals who emigrate carry with them a certain amount of useful knowledge, of which others are ignorant. So the United States have appropriated more than any other country the scientific discoveries of the races of the world. These discoveries brought together give rise to others. According to Edison the United States contain one hundred and fifty real inventors who increase the wealth of the country from five hundred

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[1] E. Castellar, "La Politique Espagnole" in the *Revue Politique et Parlementaire*, 1895, p. 227.

[2] Cf., Ch. de Colan, "Les lowlanders et l'histoire d'Ecosse" in *Science Sociale*, neuvième livraison, 1895, p. 254.

million to a milliard of francs per year.[1] Agriculture was more advanced in France under Henry IV. and Louis XIV. than in England. The English learned manufacturing from Flanders, and availed themselves of the experience of Portugal, Holland, and France, in colonisation and navigation. They brought together in their own country the greatest socio-economic conquests made by other countries, and these constituted the natural basis for further advances. The results are well known.

In China many discoveries, among them the most important which have determined European civilisation, were made before they were made by the white race. But they were not completed. It is competition, struggle, developing among individuals through the spirit of emulation exerted to increase individual happiness, which produces the advance of civilisation. Social progress is the sum of individual advances.

Individuals associate in various ways for the purpose of increasing their own welfare by appropriating natural forces in the best possible way, but when a group of individuals unites not to avail itself of natural forces, but to appropriate what other individuals have obtained, this association becomes anti-social, injurious to general welfare, and in the interest of all it should be suppressed. Such associations begin in the form of those called by the specific name, robbers, pass to coalitions of laborers and manufacturers, and end in such undertakings as those of the Panama Company in France, and the Italian organisation of bankers. The latter are as damaging to the development of social prosperity as an association of genuine robbers, disturbing social welfare and tending to destroy it. Being alike, their punishment, from the social point of view, ought to be the same.

VI.

If, instead of comparing the intellectuality of the colored race with that which the white race has acquired, it were possible to take the intellectual development of the white race many years ago,

[1] Cf. J. Novicow, *Les gaspillages dans les sociétés modernes*, Paris, 1894, p. 69.

when the social-economic system was at the same level with that of the real colored races, I am convinced that many of the illusions in regard to the superiority of the white race would be destroyed. The truth is that certain nations belonging to the white race and called superior, have founded civilisations much inferior to the civilisation of the yellow race, or even of the black. There is no people belonging to a race originally superior. There are nations which *under certain conditions* have established empires more powerful, and civilisation more durable than those of other races.[1]

This much is clear: The white peoples have gradually reached a certain degree of civilisation. This civilisation is characterised by intellectual development. Physical force has remained constant. A Hottentot has perhaps greater physical strength than a Parisian, but can it be admitted that the superior intellectual power of the European was of sudden birth? This is not admissible, because civilisation which is its reflex, has progressed slowly, sometimes receded, through long periods of time. The intelligence of the white race is, I repeat, a product of development.

The famous theory of cranial capacity has had many denials. However, it may be affirmed that in general the cranial capacity of the whites is somewhat greater than that of the colored races. The average cranial capacity of the Indo-European is said to be 1,534 grams, that of the African negro, 1,371 grams, that of the Australian, 1,228 grams. But, even if we admit an intimate relation between the development of the cranial capacity and social progress, that is by no means to admit that the Indo-European has passed suddenly from a low grade of intelligence to that which he possesses to-day. The intellectual conquests which have produced the white man have been gradual and slow. The results of these conquests are consolidated in the human brain. This is due to the well known law of heredity, which is one of the chief supports of the theory of evolution.

No white child has ever been born with a greater intellectual

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[1] Leon Metchnikoff, *La civilisation et les grands fleuves*, Paris, 1889; B. Lazare, *op. cit.*

development than that of a negro child. Flechsig, who will be recognised as an authority, declares that a new-born child, especially if its birth has been premature, when the nervous fibres of the brain are almost completely deprived of myelin is exactly like one of the lower animals.[1] Man, in a state of nature, says Fouillée, is like a child, a sensitive, impulsive being.[2] And yet the psychological aptitudes of the child born to civilised parents are enormously greater than those of a savage child. Exaggerating this fact, Mismer writes: "The child of an uncultivated race is obliged to learn everything, while the child of the civilised race has only to remember."[3] It is then absurd to expect that a colored man, brought into a civilised society of whites, should find himself completely adapted to his social environment and proceed to contribute to new scientific discoveries. Not only the psychical but even the physiological superiority of the white man has been slowly acquired.

It is due chiefly to the fact that owing to the geographical position which the white man occupies, he is compelled continually to struggle with other men. On the other hand, the colored race contend chiefly against their natural environment. The white man, brought into contact with other societies, develops his power of adaptation to social environment, and that is possible only by the aid of psychic development. But the colored man learns how to adapt himself to his natural environment in a manner truly wonderful. Thus the Boschimans, often exposed to the pangs of thirst learn how to discover the presence of water far under ground. Lying down they detect afar off the rising vapor which to other eyes is imperceptible. The Esquimaux, unacquainted with the use of fire, in order to warm themselves go into a hut of snow. The circulation of the blood becomes there more active than under their thick and heavy clothes. These people pass from a high degree of

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[1] Paul Flechsig, *Gehirn und Seele*, Leipzig, 1895, and the *Revue générale des sciences pures et appliquées*, 1895, p. 790.

[2] A. Fouillée, *op. cit.*, p. 81.

[3] Mismer, *Le monde musulman. Souvenirs de la Martinique et du Mexique pendant l'invasion française*, Paris, Sandoz.

corpulency to a pitiable thinness, according as food is abundant or scarce. The European to-day could never adapt himself to such an uncertain diet. However, in a prehistoric epoch, when his intellectual rank was much lower, he was compelled to undergo the alternation of more and less abundant natural production. These so-called human races are different, because they have undergone different conditions of natural environment, because the competition and the contact between societies and individuals have been different. Wherever there is lacking to a race a true social competition, the intellectual rank is lowered. That does not mean that it could not advance if it were placed in the same condition of life as the white race.

Pearson, Le Bon, and others, ask in dismay: "How shall we stop this flood of colored races which threatens to engulf the white States?"[1] and Fouillée with no less fear remarks: "A colored population doubles in forty years. In China alone there are already four hundred millions. About the middle of the next century there will be eight hundred millions."[2] So these authors are in accord in proposing a great European league of the civilised races for resisting by force the rising tide of colored races. Anything more mean-spirited could not be suggested. We, being separately deficient in physical force and the force of numbers, propose to unite and bring on a struggle with the colored races, availing ourselves of our united superiority. But this is hardly worth considering, for such a precaution would be no precaution at all. With this federation of civilised races we propose to keep the colored races in their own countries. Very well, but will this prevent their increasing rapidly, whatever their condition may be? Then when they have reached an enormous number, much greater than at present, what is to prevent this vast and savage population from falling upon the civilised world and destroying it? To-day this is not a real danger, but it

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[1] Pearson, *National Life and Character*, London, 1893; G. Le Bon, *Les civilisations de l'Inde*, Paris, 1890.

[2] It may be noted incidentally that these calculations have no scientific value whatever. Variations in population cannot be foreseen, especially in countries poor and uncivilised.

may become a reality. If the whites are superior to the colored races, it is with this superiority that they must conquer.

Let us now see what would be the result if the white races should attempt to assimilate the colored. It would certainly result in a betterment of the economic condition of the latter. Now it is a fact ascertained demographically and shown in the splendid works of Levasseur, Cheysson, Messedaglia, Spencer, and others, that the birth-rate of a people is in inverse ratio to its economic welfare. In proportion as the latter increases, the birth-rate diminishes. The colored races brought into contact with the whites ought, therefore, to diminish their actual birth-rate.

Qualenno has written that the colored immigrants in the United States are diminishing. This is not true, they are increasing. But it is true that proportionally their increase is inferior to that of the rest of the population. This fact is proved by the data of the last census. See then to what the much feared prolificacy of the colored races reduces itself when they are brought into contact with the whites. The colored races which are quite uncivilised cannot resist the whites in the social competition. The Oceanic race, confronted by the European, melts from sight. The Indians of America are diminishing in number every day, in spite of the protection afforded by the English Government and by that of the United States. In the Sandwich Islands, Cook, about the end of the last century, found a population of three hundred thousand. To-day there are only forty thousand.

Even if in Europe immigration were left perfectly free to the colored race, it will diminish in number, and will be unable to resist our social competition. This is the opinion expressed by Elisée Reclus.

The Chinese gradually, and perhaps less rapidly than the Japanese, are assimilating many European discoveries. Consequently, the commerce of China, in spite of war and the devastations caused by cyclones in the South, and the pest at Canton and Shanghai, is gradually increasing. The duties collected on imports amounting to 122,500,000 hiahram taëls (a taël equals £4 12s.) have reached an excess over those of 1893 of more than half a million. The ex-

ports have increased from 116,600,000 to 128,100,000. These include cotton, black tea, tea in bricks, raw white silk, oil, furs, and wool. And the Chinese are increasing prodigiously the importation of machinery as rapidly as the government removes the restrictions. With the increasing competition between individuals, the standard of life of this people has been considerably modified. This fact is increasing their intellectual development.

That which is improperly called a race is never an ethnological unit, but an historical, intellectual, or moral unit. It is so of the Chinese, of the Japanese, and of other colored races. In contact with European life, these races are visibly modified. When they enter the numerous relations of exchange with civilised people, that means that general welfare will be increased. The natural energies of the globe will be better utilised for humanity than they are now. Various human associations are formed for increasing the comfort of individuals, and for rendering labor more productive.

Why should the colored races be the declared enemies of the whites, or *vice versa?* Does this increase their welfare or their wealth? Not in the least. On the contrary, it diminishes it. "Evil," says Bentham, "in the last analysis, of whatever kind it may be, is pain or loss of pleasure."[1] Then why should not these people unite in order to aid each other in the labor of production? Is the color of skin an impediment?

The Chinese emigrate willingly to the United States. In the last few years they have formed a colony of 100,000 individuals. These Chinese go to the United States because they find it profitable to do so. If the proprietors of manufactories employ them, that means that they find their labor useful. One fine day the government at Washington restricts the immigration of the Chinese. It has yielded to a coalition of laborers, which, as we have seen, is the negation of all sense of justice. Such action on the part of the Government at Washington surely does not increase the welfare or the wealth of the United States, and it opens the way for the same restrictions against the Italians and all other immigrants who

[1] J. Bentham, *Works*, French translation, Brussels, 1842, Vol. I., p. 262.

will accept a low wage. Some time it may reach the stage of forbidding all immigration, to which the United States owes its greatness. How their prosperity would be diminished by such an act, or by any other social-economic exclusiveness! It would diminish the welfare of the very ones who think they would be benefited.

See how Chinese exclusiveness has condemned that people to continuous poverty. Men are not born to fight each other, and to rob their neighbors. Let this be done by barbarous people who do not know how to work. People who have arrived at a certain degree of mental development know that the true source of social welfare is the production of wealth obtained by means of labor. Now the productivity of labor is enormously increased by association, and by the assistance of the discoveries of science. If the white people should give direction to the labor of the colored races, the welfare of both will be increased, and in the long run all the differences and prejudice of the different races will disappear.

To-day a good is mistaken for an evil. A colored laborer offers his work for a low wage. Is it not true that so far as the white race is concerned this is just so much gain? When the intellectual development of a colored laborer has increased and he demands a higher salary, perhaps this question may be looked at in a different way.

The conflict of races, of societies, of classes, etc., is only a manifestation of the spirit of exclusiveness. Individuals instead of working and associating their labor for increasing their welfare, contend against each other. They are deluded into thinking that the spoliation of others and the transforming of themselves into parasites increases their welfare. These antagonisms of races, of societies, of classes, in reality are attempts to transform themselves into parasites or to react against social parasitism.

The Roumanians struggle against the Magyars because they are despoiled by them in a most shameful manner. The southern States of the North American union wished to separate from the northern for the same reason. This parasitism would never have produced the loss of sixty-two milliards, which is the sum at which the damages occasioned by the War of Secession are estimated.

The spirit of exclusiveness finds its natural basis in ignorance, in blind individualism. The cautious human egoist sees that the only source of welfare and of wealth is labor, and for two individuals who find it profitable to work together in order to increase their mutual welfare, diversity of race, of color, of form of the head, of nationality or social class, constitute no impediment. If all men are once convinced of this truth then the spirit of exclusiveness will disappear. Then in sociology the question of the origin of races and of civilisations will no longer command the same interest as to-day.

G. FIAMINGO.

ROME.

THE MYTHOLOGY OF BUDDHISM.

BUDDHISM is of all religions the most elaborate as a system of thought. It offers a complete philosophy, which is an outspoken positivism with decidedly anti-metaphysical tendencies. It propounds a psychology which is worked out in its most important details, and is quite up to date. Its morality possesses a definite method, showing upon philosophical principles the baselessness of hatred and proclaiming the maxim of universal love; and, in addition to all this, Buddhism has developed an exuberant mythology.

PURE BUDDHISM.

Buddhism is the religion of salvation through enlightenment, and its tenets are briefly summed up in the four noble truths.

The first noble truth is the recognition of the existence of suffering, as an intrinsic and not merely accidental feature of life.

The second noble truth states that the origin of suffering is the craving or clinging that clamors for the gratification of desire; it is the pursuit of pleasure, the yearning for the Vanity Fair of life, the lust of the senses, and the infatuation of all selfish conceits.

The third noble truth is devoted to the emancipation from suffering by a radical abandonment of craving. It teaches that salvation is obtained by cutting off the thought of self and all its egotistic yearnings.

The fourth noble truth points out the way to emancipation, which consists of (1) right comprehension; (2) right aspirations; (3) right speech; (4) right conduct; (5) right living; (6) right endeavor; (7) right self-discipline; and (8) the attainment of the right bliss.

The word "right" is purposely repeated to emphasise that not every aspiration or endeavor, however well meant, can lead to emancipation, but only the right one, only that one which is based upon a true conception of the nature of existence and the impermanence of all compound things. There is nothing in the world that deserves attachment, for nothing is lasting, not even the great world-systems, not even the gods. Man himself is not permanent, and his soul does not consist of a permanent and immutable self or an âtman, as the Brahmans call it. Every man in his individual existence is the summed-up result of the deeds done in this and in former lives. His character consists in, and is determined by, his deeds, and according to his deeds his character will endure in after life.

Yet while the individual incarnation, being a material compound, is not permanent, man can attain to that which is permanent; and the permanent, the indestructible, the deathless is, in a word, called Bôdhi. Bôdhi is enlightenment; it is the attainment of truth; it is the recognition of that which is eternal. He who attains to enlightenment has become an incarnation of the Bôdhi; he has become a Buddha and has reached Nirvâna, the state of immortality, the highest bliss, in which all craving and all attachment to anything impermanent, has ceased.

This is, in brief outline, the sum total of the Buddhist doctrine, which has been realised in the lives of many Buddhist saints, worked out in detail by Buddhist scholars, popularised by poets in Jataka tales and mythological descriptions, and represented by artists in sculpture and in painting.

MÂRA, THE EVIL ONE.

The many-sidedness of Buddhism is well illustrated in the Buddhistic conception of evil and of a final escape from evil, which is taught to the thinker in the shape of a philosophy, and to the uneducated masses in the garb of a poetical myth, affording the artist a good opportunity for representing deep thoughts in allegorical form.

Evil is personified in Mâra, the Buddhist Devil, who represents temptation, sin, and death, while the final escape from evil, the nirvanic conditions of mortals who are humbler than Buddha himself, found expression in the belief that all good Buddhists would be reborn in the Western Paradise.

Mâra is identified with Namuche, one of the wicked demons in Indian mythology with whom Indra struggles. Namuche is the mischievous spirit who prevents rain and produces drought. The name Namuche means "not letting go the waters." However, Indra, the god of thunder-storms, forces him to surrender the fertilising liquids and restores the life-bringing element to the earth.

Mâra is also called Pâpîyân[1] the Wicked One or the Evil One, the Murderer, the Tempter, in addition he is said to be Varsavarti,[2] meaning "he who fulfils desires." Varsavarti, indeed, is one of his favorite names. In his capacity as Varsavarti, Mâra personifies the fulfilment of desire or the triple thirst,[3] viz., the thirst for existence, the thirst for pleasure, the thirst for power. He is the king of the Heaven of sensual delight.

There is a deep truth in this conception of Mâra as Varsavarti. It means that the selfishness of man is Satan and the actual satisfaction of selfishness is Hell.

This reminds us of one of Leander's *Märchen*, in which we are told that once a man died and awoke in the other world. There St. Peter appeared before him and asked him what he wanted. He then ordered breakfast, the daily papers, and all the comforts he was accustomed to in life, and this kind of life lasted for many centuries until he got sick of it and began to swear at St. Peter and to complain of how monotonous it was in Heaven, whereupon St. Peter informed him that he was in Hell, for Hell is where everybody has

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[1] *Pâpîyân* means "more or very wicked;" it is the comparative form of the Sanskrit *pâpin*, wicked.

[2] *Varsavarti* is Sanskrit. The Pâli form is *Vasavatti*, derived from *vasa*, wish, desire. Childers explains the word as "bringing into subjection." Mâra is also called Paranimmita Vasavattí, which means "bringing into subjection that which is created by others."

[3] Pâli, *tanhâ:* Sanskrit, *trishnâ*.

his own sweet will, and Heaven is where everybody follows God's will alone.

In the Dhammapada, Mâra is not so much a person as a personification. The allegorical nature of the Evil One is plainly felt in every passage in which Mâra's name occurs. We read, for instance:

> "He who lives looking for pleasures only, his senses uncontrolled, immoderate in his food, idle and weak, him Mâra will certainly overthrow as the wind throws down a feeble tree."

LAKSHMI, THE GODDES OF BEAUTY.
(Musée Guimet.)

Buddhist artists employed at the same time, as symbols of evil, all those mythological personages who, to the minds of the Indian people, represent sensuality, cruelty, and destruction. Lakshmi, the goddess of beauty, who, according to the Mahâbhâvata, originated like Aphrodite, from the froth of the ocean, remained the ideal of womanhood and conjugal love, while Kâlî, the goddess of the hundred names, represented the ruthless cruelty of nature's laws.

Kâlî is, in spite of her horrible appearance, one of the greatest goddesses of India, who is worshipped among the Hindus even to-day under various names and forms. As the consort of Shiva she is called Pârvatî, the blessed mother; as Durgâ (which means "hard to go through") she symbolises all kinds of danger and is regarded as the goddess of war. As Kâlî she is identified with time, the all-devourer, and is pictured as enjoying destruction, perdition, and

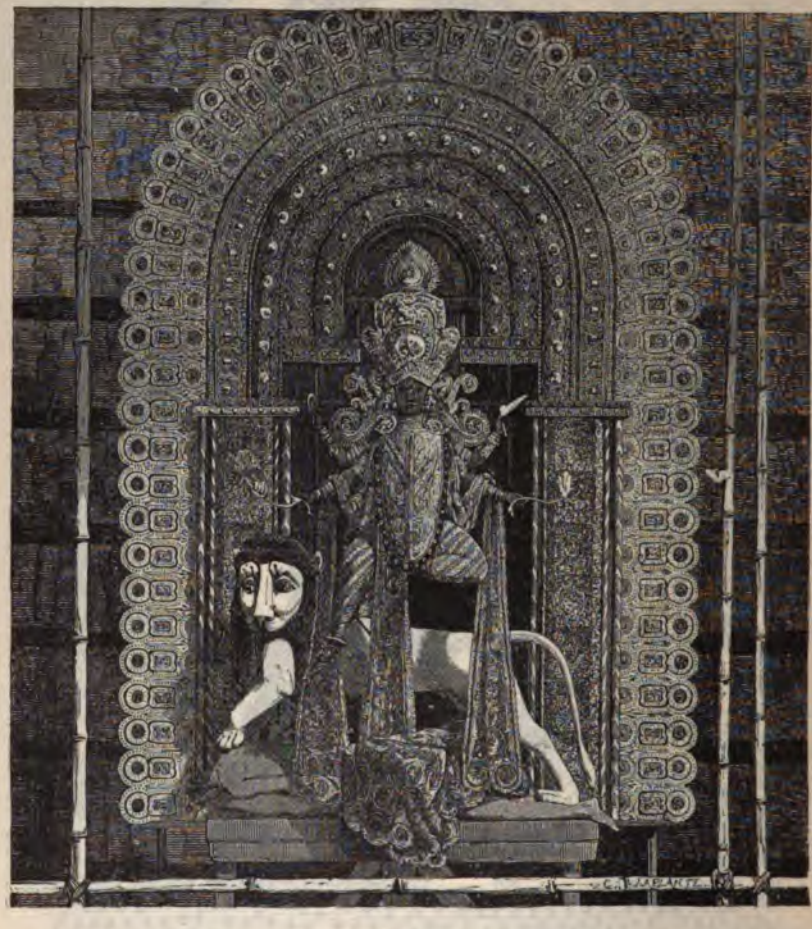
murder in any form, trampling under foot even her own husband. There is scarcely a village without a temple devoted to her, and her images can be seen in thousands of forms. Her appearance is

KALI.
After an Indian picture. (Reproduced from Schlagintweit.)

pleasant only as Pârvatî, in all other shapes she is frightful, and we can perfectly well understand that among Buddhists her divinity changed into the awful features of a demon of evil.

MÂRA, THE ENEMY OF BUDDHA.

In the life of Buddha, Mâra plays an important part. He is that principle which forms an obstacle to the attainment of Buddhahood. Having told how, in the sight of the great renunciation,



DURGA.
Indian sculpture. (Reproduced from Schlagintweit.)

the deity of the gate opened it to let the future Buddha out, the Jataka continues:

"At that moment Mâra came there with the intention of stopping the Bodisat; and standing in the air, he exclaimed, 'Depart not, O my lord! in seven days from

now the wheel of empire will appear, and will make you sovereign over the four continents and the two thousand adjacent isles. Stop, O my lord!"

When Buddha, in his search for enlightenment, had tried for seven years to find the right path in asceticism and self-mortification, his health began to give way and he was shrunken like a withered branch. At this moment Mâra drew near and suggested to him the thought of giving up his search for enlightenment. We read in the Padhâna Sutta[1]:

"Came Namuche speaking words full of compassion: 'Thou art lean, ill-favored, death is in thy neighborhood. Living life, O thou Venerable One, is better! Living, thou wilt be able to do good works. Difficult is the way of exertion, difficult to pass, difficult to enter upon.'

"To Mâra, thus speaking, Bhagavat said: 'O thou friend of the indolent, thou wicked one, for what purpose hast thou come here? Even the least good work is of no use to me, and what good works are required ought Mâra to tell? I have faith and power; and understanding is found in me. While thus exerting myself, why do you ask me to live? While the flesh is wasting away the mind grows more tranquil, and my attention, understanding, and meditation becomes more steadfast. Living thus, my mind does not look for sensual pleasures. Behold a being's purity!

"Lust thy first army is called; discontent thy second; thy third is called hunger and thirst; thy fourth desire; thy fifth is called sloth and drowsiness; thy sixth cowardice; thy seventh doubt; thy eighth hypocrisy and stupor, gain, fame, honor, and what celebrity is falsely obtained by him who exalts himself and despises others. This, O Namuche, is thine, the Black One's fighting army. None but a hero conquers it, and whoever conquers it obtains joy. Woe upon life in this world! Death in battle is better for me than that I should live defeated.

"Seeing on all sides an army arrayed and Mâra on his elephant, I am going out to do battle that he may not drive me from my place. This army of thine which the world of men and gods cannot conquer, I will crush with understanding, as one crushes an unbaked earthen pot with a stone.

"Having made my thoughts subject to me and my attention firm, I shall wander about from kingdom to kingdom training disciples extensively. They will be zealous and energetic, obedient to the discipline of one free from lust, and they will go to the place where there is no mourning.

"And Mâra said: 'For seven years I followed Bhagavat, step by step, but found no fault in the Perfectly Enlightened and Thoughtful One.'"

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[1] *Sacred Books of the East*, Vol. X., second part, pp. 69–71.

When Buddha went to the Bo-tree Mâra, the Evil One, proposed to shake his resolution, either through the allurements of his daughter or by force. "He sounded the war cry and drew out for battle." The earth quaked, when Mâra, mounted on his elephant, approached the Buddha. The gods, among them Sakka, the king of the Gods, and Brahma, tried to stay Mâra's army, but none of them was able to stand his ground, and each fled straight before him. Buddha said:

"'Here is this multitude exerting all their strength and power against me alone. My mother and father are not here, nor my brother, nor any other relative. But I have these Ten Perfections, like old retainers long cherished at my board. It therefore behooves me to make the Ten Perfections my shield and my sword, and to strike a blow with them that shall destroy this strong array.' And he remained sitting, and reflected on the Ten Perfections."—*Buddhism in Translations*. By H. C. Warren, pp. 77–78.

Mâra caused a whirlwind to blow, but in vain; he caused a rain-storm to come in order to drown the Buddha, but not a drop wetted his robes; he caused a shower of rocks to come down, but the rocks changed into bouquets; he caused a shower of weapons —swords, spears, and arrows—to rush against him, but they became celestial flowers; he caused a shower of live coals to come down from the sky, but they, too, fell down harmless. In the same way hot ashes, a shower of sand, and a shower of mud, were transmuted into celestial ointments. At last he caused a darkness, but the darkness disappeared before Buddha as the night vanishes before the sun. Mâra shouted: "Siddhattha, arise from the seat. It does not belong to you. It belongs to me." Buddha replied: "Mâra, you have not fulfilled the ten perfections. This seat does not belong to you, but to me, who have fulfilled the ten perfections." Mâra denied Buddha's assertion and called upon his army as witnesses, while Buddha declared: "I have no animate witnesses present;" but, stretching out his right hand towards the mighty earth, he said: "Will you bear me witness?" And the mighty earth thundered: "I bear you witness." And Mâra's elephant fell upon its knees, and all the followers of Mâra fled away in all directions. When the hosts of the gods saw the army of Mâra

MARA'S ARMY.
Gāndhāra sculptures Museum of Lahore. (Reproduced from Grünwedel.)

flee, they cried out: "Mâra is defeated! Prince Siddhattha has conquered! Let us celebrate the victory!"

When Buddha had attained enlightenment, Mâra tempted him him once more saying:[1]

"Pass away now, Lord, from existence! Let the Blessed One now die! Now is the time for the Blessed One to pass away!"

Buddha made reply as follows:

"I shall not die, O Evil One! until not only the brethren and sisters of the order, but also the lay-disciples of either sex shall have become true hearers, wise and well trained, ready and learned, versed in the Scriptures, fulfilling all the greater and the lesser duties, correct in life, walking according to the precepts,—until they, having thus themselves learned the doctrine, shall be able to tell others of it, preach it, make it known, establish it, open it, minutely explain it and make it clear,—until they, when others start vain doctrines, shall be able by the truth to vanquish and refute it, and so to spread the wonder-working truth abroad!

"I shall not die until this pure religion of mine shall have become successful, prosperous, wide-spread, and popular in all its full extent, until, in a word, it shall have been well proclaimed among men!"

Buddhist artists represent Mâra always as present among the audience wherever Buddha preaches or teaches. When, shortly before Buddha's death, Mâra repeated his words as quoted above, "Pass away now, Lord, from existence," Buddha answered:

"Make thyself happy; the final extinction of the Tathâgata shall take place before long."

MÂRA IN BUDDHIST ART.

The development of art in India begins and ceases with the ascendancy of Buddhism. It covers about one thousand years, beginning with the third century before Christ and ending with the seventh century after Christ. The inscriptions of Ashoka belong to the oldest Indian monuments we possess, and in all Indian art we can trace the influence of the neighboring Persians and Greeks.

The Gândhâra Buddhistic art represented Buddha in all the various phases of his life, especially his birth, the attainment of Buddhahood under the bo-tree, and his entering into Nirvâna. In

[1] See the Mahaparanibbana Sutta, III., 43-63, *Sacred Books of the East*, XI., p. 53, and *The Gospel of Buddha*, Chap. 94, vv. 9 ff.

addition to these three turning-points in his life, he is represented as the teacher, and there are innumerable illustrations of the many parables and Jataka tales with which he adorned his doctrines.

SCENES FROM BUDDHA'S LIFE.
Gândhâra sculptures. (Reproduced from Grünwedel.)

In the various sculptures of Buddhistic art there is a figure holding in his hand a kind of double club or vajra—i. e., thunderbolt, as it is usually called. Since the expression of this man with

the thunderbolt decidedly shows malevolence, the interpretation naturally suggested itself that he must be one of Buddha's disciples who was antagonistic to his teachings. The common explanation of this figure, accordingly, designated him as Dêvadatta, the Bud-

SCENES FROM BUDDHA'S LIFE.
Gândhâra sculptures. (Reproduced from Grünwedel.)

dhistic Judas Iscariot, who endeavored to found a sect of his own, and who according to Buddhistic legends is represented as an intriguer bent on the murder of Buddha. The various representations of this figure, however, are not altogether those of a disciple who tries to outdo Buddha in sternness and severity of discipline,

but frequently bear the character of a Greek faun, and resemble, rather, Silenus, the foster-father of Bacchus, representing all kinds of excesses in carousing and other pleasures. Moreover, the same figure with the thunderbolt appears in representations of Buddha's entering Nirvâna, at a time when Dêvadatta had been long dead. Alfred Grünwedel, for these reasons, proposes to abandon the tra-

BUDDHA, TEMPTED BY MARA'S DAUGHTERS.
Gândhâra sculptures. (Reproduced from Grünwedel.)

ditional interpretation of the thunderbolt-bearer as Dêvadatta, and it appears that he has found the right interpretation when he says:[1]

"This figure which accompanies Buddha from the moment he leaves his father's house until he enters Nirvâna, and who waylays him in the hope of awakening in him a thought of lust or hatred or envy, who follows him like a shadow, can be no one but Mâra Pâpîyân, the Wicked One, the demon of passion. The thunderbolt in Mâra's hand is nothing but the old attribute of all Indian gods. In his capacity as the god of pleasure, Mâra is especially entitled to this attribute of the Hindu gods. As Vasavatti he reigns in the highest domain of the pleasure heaven, surrounded by dancing girls and musicians."

[1] *Buddhistische Kunst in Indien.* Berlin: Spemann, p. 87.

It seems probable that the contrast in which Mâra or Varsavarti stands to the Buddha began by and by to be misunderstood. For the thunderbolt-bearer Vajrâpani is gradually changed into a regular attendant of Buddha, and the Vajra, or thunderbolt, is now interpreted as an attribute of Buddha himself. Thus it happened that among the northern Buddhists the Vajra became the indispensable attribute of the lamas. It is called Dorje in Tibet and Ojir in Mongolia.

The attack of Mâra upon Buddha under the bo-tree is a favorite subject of Buddhist artists, who gladly avail themselves of this opportunity to show their ingenuity in devising all kinds of beautiful and hideous shapes. Beautiful women represent the temptations of the daughters of Mâra (see cut on page 427), and the hideous monsters describe the terrors of Mâra's army (see cut on page 423).

In Buddhistic mythology Mâra, the Evil One, is, in harmony with the spirit of Buddha's teachings, represented as the Prince of the World. It is Mâra who holds the wheel of life and death (*Chavachakra*, i. e., wheel of becoming) in his hands, for all living beings reside in the domain of death. The hand of death is upon every one who is born. He is the ruler in the domains of the nidânas, the twelve links of the chain of causation, or dependent origination.

In this conception Mâra is represented as a powerful demon holding in his clutches the whole world of heaven, earth, and hell.

THE TWELVE NIDÂNAS.

The twelve nidânas are a very old doctrine, which possibly goes back to Buddha himself, and may contain elements that are older. While the general meaning of the chain of causation is clearly indicated by the first and last links, which imply that ignorance, not-knowing, or infatuation is at the bottom of all evil, there are great difficulties in the interpretation of the details, and Mr. Warren thinks that it is a combination of two chains of causation representing similar thoughts. He says:

"The Buddhist Sacred Books seem to claim Dependent Origination as the peculiar discovery of the Buddha, and I suppose they would have us understand

that he invented the whole formula from beginning to end. But it is to be observed that the formula repeats itself, that the human being is brought into existence twice —the first time under the name of consciousness and name and form and by means of ignorance and karma, the second time in birth and by means of desire (with its four branches called attachments) and karma again, this time called existence.[1] Therefore, though Buddhaghosa is at great pains to explain this repetition as purposely intended for practical ends, yet one is much inclined to surmise that the full formula in its present shape is a piece of patchwork put together of two or more that were current in the Buddha's time and by him—perhaps expanded, perhaps contracted, but at any rate made into one. If the Buddha added to the formula of Dependent Origination, it would appear that the addition consisted in the first two propositions. For ignorance, of course, is the opposite of wisdom, and wisdom is the method for getting rid of ignorance."—*Buddhism in Translations*, p. 115.

Whatever may have been the original wording, the traditional formula of the causation of evil has been, without change, faithfully preserved in the triumphal progress of Buddhism from India to Japan. One of the oldest passages of the twelve nidânas is found in the *Questions of King Milinda*, p. 79, where we read:

"By reason of ignorance came the Confections, by reason of the Confections consciousness, by reason of consciousness name-and-form, by reason of name-and-form the six organs of sense, by reason of them contact, by reason of contact sensation, by reason of sensation thirst, by reason of thirst craving, by reason of craving becoming, by reason of becoming birth, by reason of birth old age and death, grief, lamentation, sorrow, pain, and despair. Thus is it that the ultimate point in the past of all this time is not apparent."—Translated by T. W. Rhys Davids in *Sacred Books of the East*, Vol. XXXV.

The Saṃyutta Nikâya replaces the second nidâna "confections" by "karma," i. e., action. The passage reads:

"On ignorance depends karma;
"On karma depends consciousness;
"On consciousness depend name and form;
"On name and form depend the six organs of sense;
"On the six organs of sense depends contact;
"On contact depends sensation;
"On sensation depends desire;
"On desire depends attachment;
"On attachment depends existence;

[1] The Visudhi Magga declares karma-existence is equivalent to existence.

"On existence depends birth;

"On birth depend old age and death, sorrow, lamentation, misery, grief, and despair. Thus does this entire aggregation of misery arise.

"But on the complete fading out and cessation of ignorance ceases karma;

"On the cessation of karma ceases consciousness;

"On the cessation of consciousness ceases name and form;

"On the cessation of name and form cease the six organs of sense:

"On the cessation of the six organs of sense ceases contact;

"On the cessation of contact ceases sensation;

"On the cessation of sensation ceases desire;

"On the cessation of desire ceases attachment;

"On the cessation of attachment ceases existence;

"On the cessation of existence ceases birth;

"On the cessation of birth cease old age and death, sorrow, lamentation, misery, grief and despair. Thus does this entire aggregation of misery cease."—*Buddhism in Translations*, Warren, p. 166.

The Pâli terms are: (1) *avijja* (ignorance), (2) *sankhâra* (organised formation) or *kamma* (Karma), (3) *viññana* (sentiency), (4) *nama-rupa* (name and form, i. e., individuality), (5) *salâyatana* (the six fields, i. e., the five senses and mind), (6) *phasso* (contact), (7) *vêdana* (sensation), (8) *tanha* (thirst), (9) *upâdâna* (craving), (10) *bhava* (growth), (11) *jâti* (birth), (12) *jarâmarana*, etc. (old age, death, sorrow, etc.).

It seems that we have three chains of causation combined into one. One chain explains that Karma, i. e., deed or activity, produces first *viññana* (sentiency), and then *nama-rupa* (name and form, or personality); the other begins with sensation, as known in the six senses or *salâyatana*, which by contact (*phasso*) produces first consciousness (*vêdana*) and then thirst (*tanha*). The third group, which may be the peculiarly Buddhistic addition to the two older formulas, is founded in the first, or first and second, and the four concluding links of the traditional chain, stating that ignorance (*avijja*) produces blindly in its random work organisations (*sankhâras*). These sankhâras or elementary organisms are possessed of craving (*upâdâna*), which leads to conception (*bhava*) and birth (*jâti*), thus producing old age, death, sorrow, and misery of any kind.

THE WHEEL OF LIFE.

Judging from a communication of Caroline A. Foley (in the *Journal of the Royal Asiatic Society*, 1894, p. 389), the allegory of

AN INDIAN WHEEL OF LIFE.
Preserved in the Cave Temples of Ajanta, Central India.
(Reproduced from L. E. Waddell's picture in the J. R. A. S.)

the world-wheel, the wheel of life, must be much older than is commonly thought, for it is mentioned already in the *Divyâvadâna*, pp. 299–300. Caroline Foley says:

"There it is related how Buddha instructed Ananda to make a wheel (*cakram kârayitavyam*) for the purpose of illustrating what another disciple, Maudgalyâ-

yana, saw when he visited other spheres, which it seems he was in the habit of doing. The wheel was to have five spokes (*pancagandakam*), between which were to be depicted the hells, animals, pretas, gods, and men. In the middle a dove, a serpent, and a hog, were to symbolise lust, hatred, and ignorance. All round the tire was to go the twelve-fold circle of causation (*pratitiyasamutpâdo*) in the regular and in the inverse order. Beings were to be represented 'as being born in a supernatural way (*aupapâdukah*), as by the machinery of a waterwheel, falling from one state and being produced in another.' The wheel was made and placed in the 'grand entrance gateway' (*dvârakoshtake*), and a bhikshu appointed to interpret it."

Samsâra, or the circuit of life, the eternal round of birth, death, and rebirth, as summarily expressed in the doctrine of the twelve nidânas or twelve-linked chain of causation, is painted around the tire of the wheel.

How carefully the Buddhistic conception of Mâra, as the Prince of the World, holding in his clutches the wheel of life, has been preserved, we can learn from a comparison of an old fresco in the deserted caves of Ajanta, Central India,[1] with Tibetan and Japanese pictures of the same subject.[2] All of them show in the centre the three causes of selfhood, viz., hatred, spite, and sloth, symbolised in a serpent, a cock, and a pig. They are called the three fires, or the three roots of evil, which are *raga* (passion), *doso* (sin), *moho* (infatuation). The Hindu picture exhibits six divisions—the realm of gods, the realm of men, the realm of nâgas (or snakes),[3] the realm of paradise, the realm of ghosts, and the realm of hell. The Tibetan picture shows the same domains, only less distinctly separated, while the Japanese picture shows only five divisions. In order to show the omnipresence of the Buddha as the principle that sustains all life, the Japanese picture shows a Buddha statue in the hub, while in the Hindu wheel every division contains a Buddha

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[1] Described by L. A. Waddell, M. B., M. R. A. S., in the *Journal of the Royal Asiatic Society*, April, 1894.

[2] The Tibetan and Japanese pictures are explained by Professor Bastian in his *Ethnologisches Bilderbuch*.

[3] We must remember that in some parts of India the serpent is the symbol of perfection and wisdom,—a belief which was adopted by the Ophites, a gnostic sect which revered the snake of the Garden of Eden as the instructor in the knowledge of good and evil and the originator of science.

figure. This Buddha in the world is the Buddha of transformations, *Nirmâna-Kâya*, representing the tendency of life toward enlightenment. Outside of the wheel two other Buddha figures appear. At

A TIBETAN WHEEL OF LIFE.
(Reproduced from Bastian.)

the right-hand corner there is Buddha, the teacher, in the attitude of expounding the good law of righteousness. It is the *Dharma-Kâya*, the Buddha embodied in the dharma, i. e., the law, religion,

or truth. In the left-hand corner there is Buddha in the state of rest, represented as *Sambhoga-Kâya*, the Buddha who has entered into Nirvâna and attained the highest bliss.

The twelve nidânas are an essential element in the Buddhist wheel of life, and are commonly represented by twelve little pictures either on the tire or surrounding the tire.

A JAPANESE WHEEL OF LIFE.
(Reproduced from Bastian.)

On the Japanese wheel, which exhibits the nidânas more clearly than the older wheels, the series begins at the bottom, rising to the left-hand side and turning down again on the right-hand side.

The first nidâna (in Pâli *Avijja*), ignorance, is pictured as a passionate man of brutish appearance.

The second nidâna (in Pâli *Sankhâra*, Sanskrit *Samskâra*), which is commonly but badly translated in English by "confection,"

represents the ultimate constitutions of life or primary forms of organisation, meaning a disposition of structures that possess the tendency to repeat a function once performed. It is represented as a potter's wheel on which vessels are manufactured. The word should not be confused with *samsâra*, which is the whole wheel of life, or the eternal round of transmigration.

The third nidâna is viññâna, or awareness, being the sentiency that originates by the repetition of function in the dispositions or organised structures previously formed. It is animal sense-perception, represented as a monkey.

The fourth nidâna is "nama-rupa," i. e., name and form, which expression denotes what we call personality, the name of a person and his personal appearance. It is represented by a pilot steering a boat.

The fifth nidâna is called the six fields or "shadâyatana," which are what we call the five senses and mind, or thinking, which is considered by Buddhists as a sixth sense. It is pictured as a human organism.

The sixth nidâna is phasso or sparsa, i. e., the contact of the six fields, with their objects, represented as a lovers' embrace.

Rising from a contact of the six fields with their objects, the seventh nidâna is produced as Vêdâna, i. e., sensation or sentiment, illustrated by a sighing lover. If the sixth nidâna is enacted in the garden scene of Goethe's "Faust," the seventh is characterised by Margaret's song, "My peace is gone, my heart is sore." (Scene xv.).

From sentiment, as the eighth nidâna, tanha, i. e., thirst or desire, rises. The picture exhibits the flirtation of two separated lovers.

The ninth nidâna is "upâdâna," i. e., the clinging to existence. The picture shows us the lover following the footsteps of his love.

The tenth nidâna is "bhava" (bridal embrace), or existence in its continuation, finding its artistic expression in the union of the lovers, who, seated on the back of an elephant, are celebrating their marriage feast.

The eleventh nidâna is birth, "Jâti," in the picture represented as a woman in her throes.

The remaining groups represent the twelfth nidâna and its various sufferings, which consist of old age, disease, death, lamentation, complaints, punishments, and all kinds of tribulations.

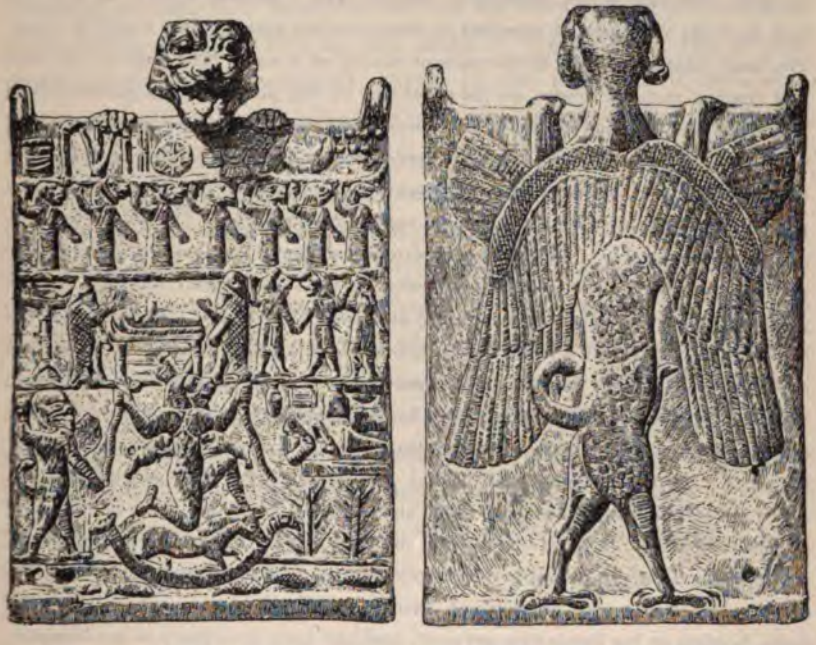
Above the wheel of selfhood, which is the hell of worldliness, appears the spotless disc of Nirvâna.

The twelve pictures on the Hindu wheel are less distinct, but there is no question about their meaning being exactly the same. Beginning at the top on the right-hand side, we find first an angry man, representing ignorance, then a figure which might be a potter forming vessels of clay on the potter's wheel, representing the formation of dispositions or primary soul-forms. The third picture represents a monkey climbing a tree, symbolising animal perception or the individuality of organisms. The fourth picture shows a ship on a stream, representing the origin of mind under the allegory of a pilot. The fifth picture seems to be a house built upon five foundation stones, which we interpret as the five senses, the superstructure representing mind, the sixth sense. Then follows the sixth picture, a woman, kindling desire of contact. The seventh represents sentiment in the shape of two sighing lovers. The eighth picture represents thirst or desire as two separated lovers. The ninth picture, reminding us of Adam and Eve in Paradise, is a man plucking flowers or fruits from a tree; it illustrates the tasting of the apple of sexual love. The tenth picture illustrates pregnancy, the eleventh birth, and the twelfth is the demon of death carrying away the white body of a dead man.

AN ANCIENT CHALDEAN WORLD-PICTURE.

The wheel of life as now frequently pictured in Buddhist temples of Japan can, in its wanderings from India through Tibet and China, be traced back to a remote antiquity, for we know positively that this conception of the Evil One in his relation to the world, existed about two thousand years ago, in the days when Buddhism still flourished in India, but it is not improbable that it must be dated back to the times before Buddha. We may fairly assume

that when Buddha lived, such or similar representations of the significance of evil in life existed and he utilised the traditional picture for the purposes of spreading his own religion, adding thereto his own interpretation, and thus pouring new wine into old bottles. There is a possibility that the picture must be dated back to the age of demonolatry, when the idea prevailed that the good god need not be worshipped but only the evil god, because he alone is dangerous to mankind.



AN ANCIENT ASSYRIAN BRONZE TABLET REPRESENTING THE WORLD IN THE CLUTCHES OF AN EVIL DEMON.
Collection of M. de Clercq. (After Lenormant.)

Among the Chaldean antiquities, many of which date back to 3,000 B. C. and to still remoter periods, there is a bronze tablet now in the collection of M. De Clercq which represents in a very concise summary the world-conception of the ancient Chaldeans. But the strangest thing about it, to which no Assyriologist has as yet called attention, is that this tablet, depicting the world as it was supposed to be according to the views of the Accadians, Assyrians, and Babylonians is held in the clutches of a monster in

very much the same fashion that the Buddhist wheel of life is handled by Mâra, the Evil One. Lenormant, from whose valuable History of the Orient we reproduce a picture of this bronze tablet, when speaking of the Chaldean ideas of hell, alludes to this curious piece of antiquity and explains the picture as follows:

"A bronze plate in the collection of M. De Clercq contains in a synoptic world-picture a representation of hell, and it is necessary that we here give a description of it. One side of the bronze plate is entirely occupied by a four-footed monster, with four wings, standing on eagle's claws. Raising himself on his hind feet, he looks as though he intended to jump over the plate against which he leans. His head reaches over the border as over the top of a wall. The face of the wild and roaring monster towers, on the other side of the plate, above a picture which is divided into four horizontal strips representing the heavens, the earth, and hell. In the top strip one sees the symbolic representations of the celestial bodies. Underneath appears a series of seven persons clad in long robes and having heads of a lion, a dog, a bear, a ram, a horse, an eagle, and a serpent. These are the celestial genii called *ighigs*. The third strip exhibits a funeral scene, which undoubtedly happens on earth. Two personages dressed in the skin of a fish, after the fashion of the god Anu, are standing at the head and foot of a mummy. Further on there are two genii—one with a lion's head, the other with a jackal's head—who threaten one another with their daggers, and a man seems to flee from this scene of horror. The picture of the fourth strip is bathed in the floods of the ocean, which according to the traditional mythology of the Chaldeans reaches underneath the foundations of the earth. An ugly monster, half bestial, half human, with eagle wings and claws, and a tail terminating in a snake's head, stands on the shore of the ocean, on which a boat is floating. This is the boat of the deity Elippu, frequently mentioned in the religious texts and probably the prototype of the boat of Charon in Greek mythology. In the boat is a horse which carries upon its back a gigantic lion-headed deity, holding in her hands two serpents; and two little lions jump to her breast to suck her milk. In the corner there are fragments of all kinds, human limbs, vases and the remainders of a feast.

"Thus this little bronze tablet contains the picture of the world such as the imagination of the Chaldeans represented it to be: the gods and the sidereal powers, angels and demons, ighigs and anunnaks, the earth and men, with supernatural beings who exercise a direct influence upon them: the dead protected by certain demons and attacked by others according to the philosophical conception of good and evil, and the antagonism of the two principles which constitutes the basis of the Assyrio-Chaldean religion. Anu protects the dead in the same way as does the Egyptian Osiris. There is the subterranean river reminding one of the Styx and Acheron of the Greeks as well as of the subterranean Nile of Amenti." (Pp. 291–292.)

It is a pity that Lenormant does not tell us anything about the significance of the demon who holds this world-picture in his clutches. It would be interesting to understand the thought of the Chaldean artist when giving such prominence to the Evil One.

Religious symbols, formulas, and rites are, as a rule, punctiliously preserved even after a radical change of the fundamental ideas that are embodied therein. Thus this bronze plate may preserve features of a world-representation long gone by; and the simplest explanation seems to be that we must regard the monster holding the world-picture as the deity of evil, who in the period when religion still consisted merely in the fear of evil, was worshipped as the actual prince of the world, and whose wrath was atoned by bloody sacrifices.

Judging, by analogy, from the religious evolution of other nations, we must assume that the original form of worship among the Accadians was as much demonolatrous as it is at a certain stage of civilisation among all savage tribes. If this view should prove to be correct, the Chaldean bronze plate of the monster holding in its claws the world would be the connecting link between the very dawn of religious notions with the foundation of Buddhism, the first among the historical religions now extant that insists on the close relation of religion to morality, proclaiming that salvation from evil can be attained only by him who walks on the noble eightfold path of righteousness.

NORTHERN BUDDHISM.

The Buddhism of Tibet is not yet sufficiently explored on account of the inaccessibility of the country, but it is safe to say that its demonology is highly developed and shows traces of strong Hindu influences. Prominent among the evil spirits is mKha'-sGrôma, who is commonly identified with the Goddess Kali of the Hindus, and is represented as a frightful monster with a leonine head, surrounded by a halo of flames and ready to devour everything she sees.

The religious conditions of China are radically different from

ours. Taoism, Confucianism, and Buddhism exist peacefully side by side, and there is scarcely a home in the country where the customary homage would not be paid to Lao-Tsze and Confucius as

mKha' sGrôma, the Tibetan Goddess Kali.
Tibetan Bronze. (Musée Guimet.)

well as to Buddha. Indeed, there are numerous illustrations in which these three great masters are together represented as dominating the moral life of China. (See *Open Court*, No. 489, p. 90.)

KONGO, THE SHERIFF. EMMA, THE JUDGE.
Carved wood, Japanese. (Reproduced from a Japanese art print.)

In Japan the conditions are similar, except that there Buddhism is more popular and at the same time better represented than in China. Taoism exists in the country of the rising sun only as a

MEIFU, THE DARK TRIBUNAL. (Reproduced from *Karma*.)

philosophy in the pure form of Lao-Tsze's teachings; yet the aboriginal nature-worship of the country, including the observation of patriotic festivals, is still preserved in Shintoism, which has of late been declared to be the official state religion of the country.

The folklore of the Chinese and Japanese was naturally embodied in the mythology of Buddhism, and we find therefore in their descriptions of Hell the figures of *Emma*, the stern judge of Meifu, the dark tribunal; of *Kongo*, the sheriff, and all the terrible staff of bailiffs, torturers, and executioners, among whom *Gozu*, the steer-head, and *Mezu*, the horse-head, are never missing. By the side of the judge's desk stands the most perfect mirror imaginable, for it reflects the entire personality of every being. Since man's personality, according to the Buddhistic soul-conception, is constituted by the deeds done during life, the glass makes apparent all the words, thoughts, and actions of the delinquent who is led before

HO NOKURUMA, THE CART OF HELL.
(After an old Japanese painting.)

it; whereupon he is dealt with according to his deserts. If good deeds prevail, he is rewarded by being reincarnated in a higher state of existence, be it on earth, or in the Western Paradise, or in one of the heavens of the gods; or, if bad deeds prevail, he sinks into lower spheres, in which case he must go back to life in the shape of that creature which represents his peculiar character; or if he has been very wicked, he is doomed to hell, whither he is carried in the *ho nokuruma*, the fiery cart, the conveyance of the infernal regions. Only if he has attained to Buddhahood, he is released from further reincarnation and enters into Nirvâna.

EVIL IN THE SERVICE OF GOOD.

In the later development of Northern Buddhism, all the evils of this world, represented in various devil personalities, are conceived as incarnations of Buddha himself, who, by showing the evil consequences of sin, endeavors to convert mankind to holiness and virtue.

We find in the Buddhist temples of China and Japan so-called Mandaras, which represent the world-conception of Buddhism in its cosmic entirety. The word *Mandara* means "a complete *ensemble*," and it exhibits a systematically arranged group of Buddha-incarnations. The statue of the highest Buddha who dwells in Nirvâna always stands in the centre. It is "Bôdhi," enlightenment, or "Sambôdhi," perfect enlightenment, that is to say, the Truth which is the same for ever and aye. He is personified under the name Amitâbha, which means boundless light, being that something the recognition of which constitutes Buddhahood. He is like God, the Father of the Christians, omnipresent and eternal, the light and life of the world, and the ultimate authority of moral conduct.

The catalogue of the Musée Guimet of Paris, the best religious museum in the world, describes a Mandara, which is the highest Buddha in the centre of the group, surrounded by a number of his incarnations of various degrees and dignities. These are the prophets and sages of the world, who have taught mankind or set them good examples by their virtuous lives. On the right we see a group of personified abstracts,—piety, charity, science, religion, the aspiration for progress. On the left is a third class, consisting of the ugly figures of demons, whose appearance is destined to frighten people away from sensuality, egotism, and evil desires.

The devils of Buddhism, accordingly, are not the enemies of Buddha, and not even his antagonists, but his ministers and co-workers. They partake of Buddha's nature, for they, too, are teachers. They are the rods of punishment representing the curse of sin, and as such may fitly be conceived as incarnations of the

Bôdhi. The Buddhist devils are instruments of education who contribute their share to the general system of working out the final salvation of man.

Christian salvation consists in an atonement of sin through the bloody sacrifice of a sinless redeemer; Buddhist salvation is attained through enlightenment. Hence Christ is the sufferer, the innocent man who dies to pay with his life the debt of others who are guilty. Buddha is the teacher who by example and instruction shows people the path of salvation.

EDITOR.

LITERARY CORRESPONDENCE.

FRANCE.

M. A. Fouillée gives us at one stroke two octavo volumes, *Le mouvement positiviste et la conception sociologique du monde*, and *Le mouvement idéaliste et la réaction contre la science positive.*[1] His aim in these two works has been to build up a "first philosophy" wherein will be harmonised the subjective and objective points of view between which speculation has always oscillated. How has he gone about this synthesis? He does not find it in mechanicalism, for the mechanical order is merely a "silhouette of the universe projected upon our thought," nor in biology, which furnishes us with an incomplete type only of the universe. Sociology alone, he says, can furnish us with a complete type. Comte foreshadowed the idea, but unfortunately, M. Fouillée adds, positivism was restricted to the objective systematisation of facts; it held to the abstract laws of the world, whereas the new idealism seeks in *man* and in *psychical activity* the ultimate explanatory principle, and is bent on representing the world in psychical terms and by means of sociological relations. In short, we have to admit, according to M. Fouillée, the unity of composition of the universe and the psychical character of that unity. Physical energy is accordingly nothing but the outward expression of moral energy, or of the will, which is omnipresent, at once founder and maker of reality. At the bottom of all are found states of consciousness in varying degrees of intensity and combination; universal relations being conceived as the first stage of the most complex relation known to us, namely, social solidarity.

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[1] F. Alcan, publisher.

Two theses, at least, are mingled here, as will be seen. Nevertheless, they may be separated. The universal solidarity of created beings is a legitimate hypothesis, but not now broached for the first time,[1] having been first suggested by astronomy and nowise depending on any particular doctrine of M. Fouillée. On the other hand, the same hypothesis, according to which the universe is resolvable into atoms that are at once matter, life, and mind, does not determine us to accept the reduction of all reality to desire and of all physical energy to states of consciousness. Moreover, I do not see the practical advantages of this mode of viewing things. I do not see what light it throws upon psychology, æsthetics, and morals, nor how it can suffice to explain the relations between subject and object, which it is still best to accept as actual facts, after the manner of everyday experience, or naïve realism. M. Fouillée seems to me to arrive, by a skilful mingling of the doctrines of Plato, Kant, Comte, and Hegel, at a sort of spiritualism without substance, a sort of psychism without soul, a sort of vitalism without organs or environment. And this situation finds expression in his system in the word "idealism,"—an idealism which is epitomised in the concept of the "idea-force," which has always been obscure, seeing that idea and force have here the value of a pure metaphysical entity.

It is an old saying that ideas rule the world, that ideals are the real moving power in social life, And I prefer to hold by this ancient formula, which is not so full of obscurities. The scholarly dialectic of M. Fouillée leads him to some grand deductions (the critical part of his works is quite remarkable), and I should be glad if I could be convinced by them. But I do not feel myself upon sufficiently solid ground to abandon myself to the guidance of so ambitious a master.

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The little volume of M. F. Le Dantec, *Le déterminisme biologique et la personnalité consciente*,[2] carries us singularly far from M.

[1] I find this hypothesis formulated in the *Principes Sociologiques* of M. Ch. Mismer, published about eighteen years ago.

[2] F. Alcan, publisher.

Fouillée. The author has undertaken here to develop the ideas relating to phenomena of consciousness which he had merely touched upon in the last chapter of his *Théorie nouvelle de la vie.* The phenomena of consciousness are for M. Le Dantec epiphenomena. As our readers already know, he very distinctly characterises states of consciousness as "inactive witnesses" of physiological life, wherein everything happens according to the laws of physics and chemistry. But what is consciousness? M. Le Dantec seeks to explain it as he has explained life. With Haeckel he regards consciousness as a property of atoms, and consequently of nervous elements (neura). Our ego would result consequently from the summing up of the epiphenomena which are produced by the activity of the different neura. In short, he takes his stand upon these two hypotheses: (1) that atoms have a fixed and inalienable consciousness for each atomic species; (2) that the atomic consciousnesses are summed up in the molecules, the molecular consciousnesses are summed up in continuous masses of plastic substances, and the plastidiary consciousnesses in the total aggregate of the nervous systems of resultant higher beings. He examines, on the basis of these facts, what elementary consciousness and what summed up consciousness is. Then he studies epiphenomena among polyplastidiary beings and explains them without recourse to the intervention of immaterial principles and without admitting anything which is antagonistic to chemical determinism.

This new book will appear perhaps more hazardous than the former one of M. Le Dantec. But it bears the same ear-marks, and I regard it a remarkable production. The author has frankly entered upon the straight path which leads to discoveries. He has the merit of great precision in analysis and many other qualities which are requisite for attacking difficult problems.

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M. Léon Bourgeois, formerly president of the ministerial council, publishes a short little work, *Solidarité*,[1] which I should not like to omit. Our thanks are certainly due to M. Bourgeois for

[1] A. Colin & Co., publisher.

essaying to find the foundations of a new political code and of a new rational faith which is above current sophisms and prejudices. He has set himself the task of showing the contractual character of social life, and of so justifying, as contrasted with revolutionary anarchy, the notions of duty and legal sanction, and as opposed to conservative routine the necessity of a constant amelioration of human affairs. But he is perhaps mistaken when he talks to us of a "doctrine" of solidarity. Solidarity is simply a fact, a condition of existence, and that condition is the analogue in social life of what we call interdependence of phenomena in the world of physics, chemistry, and astronomy. But this condition is not the only one and cannot accordingly be used in constructing a perfected political doctrine. Nevertheless, I do not deny that it is opportune to place it in relief, to show its effects in human affairs, and to seek, in fine, motives of action in the sentiment which corresponds to the theoretical knowledge of solidarity. And this sentiment is capable of acquiring such a power that every study which aims at illuminating and strengthening it is largely justified by the end which is set.

M. Bourgeois does not attack practical questions in this work, that is to say, does not attempt to carry solidarity over into the real facts, nor to harmonise it with the conditions which proceed from history, race, environment, etc. He does not overlook the latter, however. He recognises, for example, the natural inequality of men, which has always had and always will have grave consequences for the organisation of societies. We should, in fine, encourage him to devote more of his attention to these problems, and especially to disengage them from the errors which the ignorance or violence of parties so easily introduces into them.

* * *

M. J. Novicow publishes under the title of *Conscience et volonté sociales*[1] a very interesting study, in which he analyses the higher manifestations of collective life, showing how they grow, are propagated, and rendered efficacious. This study supposes and confirms

[1] Giard et Brière, publishers.

the "organic" theory of society so fiercely combated in recent years. I have already touched upon this controversy, inclining to the doctrine to which M. Novicow to-day brings valuable support. The doctrine which views society as an organism, does not prevent him from resolving social acts into psychical acts. "Social movements," he writes, "are a totalisation of cerebral and muscular movements and nothing more. Every social act is resolvable into a certain number of psychical acts." And while it is true that "the action of men upon one another does produce a peculiar resultant product," it is also true that social volitions always result from the ideas and internal sentiments of individuals, "and not all from the mere fact that they are associated together."

On the question of determinism M. Novicow is perhaps less precise. He accepts psychical determinism and rejects social determinism. "Social liberty," he says, "remains intact. The actions of men always conform to what appears to them their interest." Which is correct, provided we recognise that individual determinations necessarily find their echo in the collective life. No doubt it is useless to talk of an outward constraint upon society, of a sort of obscure destiny inhering in things; but we should certainly take account of the constraint exercised by accumulated facts—ideas, habits, institutions, etc.—for their succession, which is not at all fortuitous, constitutes precisely what we call the laws of history.

One lesson among many others may be drawn from these studies. It is the necessity even in democracies of an aristocracy, that is to say, of an élite of men sharply differentiated and adapted for the directing and governing function. M. Novicow deduces this lesson from the organic theory, and he supports it upon facts in the solidest way. He proceeds in the same manner and is not less decisive with regard to the current sophisms of "socialism."

I should like to speak at greater length of this work. It is to be recommended for the clearness of view which its author displays, for the sureness of his criticisms, his wealth of information, and for the lofty confidence which he has in the future, while not veiling any of the evils of the present.

A curious little work by M. ROISEL, *L'idée spiritualiste*,[1] sketches with rapid strokes the religions of the world and shows us their inevitable ultimate resolution in a monistic philosophy capable of satisfying at once the needs of reason and the heart. M. Roisel has the merit of being clear and succinct; his erudition is tactfully used. Perhaps he does not cite sufficient proof for his not improbable hypothesis of a "Scythian" culture to which the nations of the dolmens supposedly belong and which is held to have preceded Aryan civilisation. Under the name of Scythism would be classed the doctrine which takes for granted the primordial existence of two coeternal causes: (1) a spirit which exists by itself and alone is active; (2) a matter composed of absolutely passive molecules; the result being that the universe is the product of the constant action of the first principle upon the second. To this doctrine we should have opposed the ontological doctrine of the Aryan mind with its different developments, and the spiritualistic idea which both represent would finally give way before the atomic doctrine which slowly developed by their side and has won the adherence of so many great minds.

I recommend the perusal of this volume, which bears witness to a distinguished mind. The reader will find here, in the first part, enlightened and liberal views upon Judaism and Christianity, for example, and in the second part a very compact criticism of spiritualistic systems, where the logic and common sense of the author easily triumphs over the subterfuges of transcendent dialectics.

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There still remain to be mentioned: *L'immanence de la raison dans la connaissance sensible*, by M. GÉDÉON GORY; *Le socialisme et la science sociale*, by M. GASTON RICHARD, a careful criticism of facts and theories, written with great moderation; *L'éducation intellectuelle dès le berceau*, by M. BERNARD PÉREZ, the concluding volume of a series of works, in which the author displays his oft proved mer-

[1] F. Alcan, publisher.

its; a new edition of the *L'homme de génie*,[1] by M. LOMBROSO; and a translation of *La femme criminelle et la prostituée*, an important work of which I reserve the privilege of speaking again. I have been guilty of neglect also in not mentioning the volume of M. RENÉ WORMS, *Organisme et société*, and in doing so to-day I am sorry I cannot devote to it extended criticism.

LUCIEN ARRÉAT.

PARIS.

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[1] George Carré, publisher.—The last works mentioned are published by Felix Alcan.

CRITICISMS AND DISCUSSIONS.

THE THEORY OF MATHEMATICAL FORM.

A CORRECTION AND EXPLANATION.

In his interesting communication to *The Monist* of January last on "The Logic of Relatives," Mr. C. S. Peirce, while alluding in flattering terms to my "Memoir on the Theory of Mathematical Form," takes exception to the opinion, which he conceives to be there put forward, that "a relationship" is "nothing but a complex of bare connexions of pairs of objects," and accordingly states that "while I have learned much from the study of Mr. Kempe's Memoir, I am obliged to modify what I have found there so much that it will not be convenient to cite it, because long explanations of the relation of my views to his would become necessary if I did so."

Any criticism which comes from so distinguished a logician as Mr. Peirce must of course have great weight; but in the present instance I fear that *bonus dormitat Homerus*, for I am confident that I have never held or expressed, either directly or by implication, any such opinion as he attributes to me. On the contrary, I regard it as quite inconsistent with the fundamental principles formulated in the Memoir. I am fully alive to the many defects of my essay, and am glad of this opportunity of expressing my gratitude to Mr. Peirce for a long and valuable letter of criticism, which he sent me on January 17, 1887, a letter which led to my inserting a "Note" in the *Proceedings of the Royal Society*, Vol. 42 (1887), p. 193, containing some very necessary corrections and emendations of the Memoir. But as that Memoir has now for the second time been called to the attention of the readers of *The Monist*, Mr. F. C. Russell having referred to it with appreciation in the issue of April, 1894, I have become solicitous to maintain its reputation here at as high a pitch as possible, and am anxious, therefore, that no undeserved criticism should pass unnoticed. Mr. Peirce's article fortunately affords me abundant evidence wherein it is that he has mistaken my views, and with the permission of the Editor I propose to indicate the nature of his misconception. In doing this I may be pardoned if I seize the opportunity to state concisely and without reference to details,

exactly what the fundamental principles set forth in the Memoir are. Unless I did so, what I have to say would be scarcely intelligible.

It must be obvious to the most casual observer that the subject-matter of thought consists of much which may be dismissed from consideration without affecting those properties which it is the object of the logician or mathematician to investigate. The determination in any case of how much may be thus dismissed, of what the irreducible minimum which must be retained consists, and of the causes to which the properties of this essential residue are due, is, however, by no means simple. To effect such determination, is the object of the Memoir. It points out, in the first place, that the subject-matter of exact thought is conceived of and dealt with by the mind in the processes of reasoning as consisting of a number of separate things, as being a plurality of "units." These "units" are of every conceivable description. They may be "individuals or abstract ideas,"—to quote the words of Mr. Peirce,—or, to quote my own (Memoir, par. 4), may be "material objects, intervals or periods of time, processes of thought, points, lines, statements, relationships, arrangements, algebraical expressions, operations, operators," etc., etc. The task of specifying the exact objects or ideas which are thus conceived of and dealt with by the mind in any investigation, may in some cases be one of extreme difficulty, and mistakes are likely to occur unless the operation be conducted with great care. Thus, while no difficulty may be experienced in enumerating this or that object or idea as units which are under consideration, there may be a failure to appreciate that their "relations" are also in certain cases being conceived of and dealt with as units, and should be included in the enumeration; that the system of units before us is consequently a more extensive one than is supposed, and that unless the whole field of view is brought into focus, an erroneous impression may be created.

But, while it is important that we should not overlook any of the "units" which are really before us, it is equally important to notice that, for the purpose of defining or investigating a particular subject-matter, it is frequently useful to introduce into our field of view certain conceptions which, though valuable auxiliaries in such definition and investigation, and on occasion themselves the subject of our study, yet form no essential part of the particular subject-matter for the time being under consideration. The "relationships" existing between the objects which compose that subject-matter, the "operations" by which one individual or plurality of those objects may be conceived of as derived from another individual or plurality, and "statements" with reference to such relationships or operations are instances of "auxiliary units" which may be thus introduced. Here it may be necessary to bear in mind that such units are merely auxiliary, that they are used merely as a temporary scaffolding, which, however useful during the course of our work, may obscure the true proportions of the structure which it environs.

But probably the greatest caution is needed with regard to a somewhat subtle danger, viz., the regarding of a number of separate things or conceptions, even in-

finite in number, as if they were not many, not a plurality, but one thing or one conception only. We have, for example, a number of objects before us, and we have certain relations between pluralities of those objects also before us, and we appreciate the fact that we are dealing with these relations as units. Where the relation between the individuals of one plurality is different from that between the individuals of another, we also appreciate the fact that the former relation regarded as a unit must differ from the latter relation when so considered, and that consequently we have *two* relations before us, and not *one*. But where the relation between the units of one plurality is, in common parlance, "the same as" that between the units of another, where the two relations are said to be "identical," there are certainly many persons who would come to the conclusion that here we have but *one* relation before us, not *two*. The conclusion would, however, be a wrong one, the use of the words "the same" and "identical," though by no means uncommon, and in general not likely to lead to confusion, being here erroneous. The two relations are no doubt "undistinguishably alike," so that "one single description will apply equally to either of them" (Whately's Logic, first edition, p. 298 Appendix on Ambiguous Terms), but this is not "identity," this is not being "the same," there are *two* relations before us, and not *one*, and the failure to appreciate the fact would be to overlook a matter of fundamental importance.[1]

To follow this up, let me add that, in the remarks which ensue, when I say that two or more objects or conceptions differ from each other, I do not mean simply that they are a plurality and not one object or conception only, but that they are unlike in some respect, that something can be said of one that is not true of the other or others. On the other hand, when I say that certain objects or conceptions (in the plural) differ in no respect whatever, I do not mean that the use of the plural is erroneous and we have really only one object or conception in view, but I mean that they compose a plurality of objects or conceptions each of which is undistinguishably like each of the others, so that a description of one is equally applicable to each of those others.

The subject-matter of exact thought consists then of a mass of "units." These are not, however, conceived of by the mind as jumbled together in a mere confused heap, but exhibit a certain orderly arrangement which I term "mathematical form." What exactly is this "form," and to what is it due?

In answering this question let me ask my readers to take a somewhat general view of the subject-matter of thought.[2] From whatever point of view we regard this, the most prominent feature is probably the combination of variety and uni-

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[1] "Great confusion of ideas is often produced, and many fallacies engendered in otherwise enlightened minds by not being sufficiently alive to the fact (in itself not always to be avoided), that they use the same name to express ideas so different as those of identity and undistinguishable resemblance." J. S. Mill, *Logic*, second edition, Vol. I., p. 93.

[2] The two following paragraphs are taken almost *verbatim* from the writer's Presidential Address to the London Mathematical Society on "Mathematics" of November 8th, 1894. See *Proc. Lond. Math. Soc.*, Vol. XXVI., p. 5.

formity which it exhibits. We picture to ourselves things of every imaginable description, differing in every possible way; but the representation includes objects here few in number, there many, which do not differ from each other in any respect whatever. A still greater variety is displayed by the pluralities of the things pictured, the differences between which depend not only upon the number and peculiarities of the individual objects of which each consists, but also on those additional characteristics of unlimited diversity, which accompany every plurality, and may be concisely referred to as "relations."[1] Here again, though difference is present, its absence is equally marked; and pluralities, however complex, are rarely unique but are accompanied by other pluralities, some by one, some by more, to which they bear an undistinguishable resemblance.

Now putting aside the contemplation of the special peculiarities and characteristics of the individuals and relations which come under our observation in such infinite variety, let us confine our attention to the study of the results which flow from the mere fact that this and that individual, or this and that plurality, differ while this and that do not. We shall not, as might at first sight be supposed, thereby put away everything which gives life and interest to the subject-matter of our thought and leave nothing but a mere heap of dry bones. *Form* remains. The like and unlike individuals and pluralities which are contained in any greater plurality must be distributed in some way through the whole body of individuals composing that greater plurality, and the way in which this distribution is effected gives to the latter a characteristic "form," which may or may not be different in two pluralities of the same number of individuals.

It is this "form" which I believe to constitute all that is essential in the subject-matter of thought so far as the processes of reasoning are concerned. When the "form" is determined, those "properties" and "relations" of the subject-matter which are the study of the mathematician and logician are also determined. The rest is mere dress. It follows, of course, that two subject-matters which are of like "form," however widely they may differ in other respects, will for the exact thinker have precisely similar properties and admit of precisely similar treatment.[2]

So much for the general theory. Now let us turn to the special matter upon which Mr. Peirce has misapprehended me. For the definition of the "form" of any system of units it is necessary only to indicate which of those units, and which of the pluralities of those units, differ from each other and which do not. In order to do this it will not in general be necessary to make the indication for each separate unit and plurality. The distribution of the various differing and non-differing

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[1] Differences may exist between two pluralities though none exists between the individuals which compose them. Thus geometrical points differ in no respect from each other, but a collinear triad of such points compose a plurality which differs from the plurality composed of a triad of non-collinear points.

[2] See "The Subject-Matter of Exact Thought" by the writer in *Nature*, Vol. 43 (1890), p. 156, where the geometrical theory of points and the logical theory of statements are considered and compared in the light of the principles here set forth.

units and pluralities of any system is regulated by definite laws, so that a knowledge of the mode of distribution of some only of these components may determine that of the rest, and consequently the form of the system. There are in general several ways in which the form of a given system may be thus determined, and accordingly various different definitions of the same system may be adopted. There are certain systems the "forms" of which are fully defined when we know (1) which of their component units differ and which do not, and (2) that certain specified pairs of those units differ from the rest. The pairs may be of many different sorts, and so may the larger pluralities, but the existence of all the differences involved is fully indicated by the presence and absence of the differences between the units, and by the dichotomy of the pairs. As has already been stated, the definition of the "form" of a subject-matter may be facilitated by the introduction into our field of view of "auxiliary units." Now it is demonstrated in the Memoir that, by the introduction of a proper system of auxiliary units, an enlarged system is obtained of the special description just alluded to. The "form" of this enlarged system being determined, that of the smaller one obtained by omitting the auxiliary units is also known, and consequently is defined by the limited specifications I have mentioned. This result is a very important one in reference to the graphical representation of the "form" of any subject-matter of exact thought, for it enables us to effect such representation by means of a diagram consisting only of spots and of lines connecting certain of these spots, one to one. The spots represent the units, unlike spots representing units which differ, like spots those which do not. The various units of the system under consideration, and also the necessary auxiliary units, being duly represented, each by its representative spot, we have then merely to effect a proper division of the pairs of these spots into two sets. This may be done by connecting the two spots of each pair of the one set by a line, no lines being drawn in the case of the pairs of the other set. It matters not which of the two sets of pairs consists of the joined pairs, and which of the unjoined pairs for the lines are not employed to represent anything in the nature of a connexion between the units represented by the spots which are connected by those lines. All that is needed is that all the pairs of one set should be joined pairs, and all of the other unjoined, and that the pairs should thus be made to differ from each other.

Any subject-matter of exact thought admits then, I say, of representation by a diagram consisting of spots, and of lines connecting them in the manner indicated. Such diagrams are, however, sometimes used in an entirely different way from that in which they are used in the Memoir. The chemical diagrams showing the constitution of compounds, the "graphs" of Clifford and Sylvester, and those of Mr. Peirce in his article are instances. In these graphs the lines or bonds represent a "connexion," a "copula," a "mode of junction" between the things represented by the spots. It is quite comprehensible therefore that Mr. Peirce having such use of these bonds in mind, should have supposed that "in Mr. Kempe's method the spots represent the objects, whether individuals or abstract ideas, while the bonds

represent the relations," and that consequently "Mr. Kempe seems to consider relationship to be nothing but a complex of bare connexions of pairs of objects." It will, however, I hope, be clear from the foregoing explanation, and a reference to the Memoir itself, that I do not use, and have not there used, these lines or bonds as representing any relationship in the nature of a "connexion," but simply to distinguish certain pairs of things from others. And it will, I trust, be equally clear that because I believe that the "form" of any subject-matter may be defined by statements as to the existence and non-existence of differences between "units," and as to the existence of differences between pairs of those units, it does not follow that I believe that the complex relationships between pluralities of units which result from the possession of that form, are nothing but "complexes of bare connexions of pairs of objects."

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LONDON.

BOOK REVIEWS.

LEHRBUCH DER PSYCHOLOGIE. Von *Friedrich Jodl*, o. ö. Professor der Philosophie an der Universität zu Wien. Stuttgart: J. Cotta. 1896. Pages, 767. Price, M. 12.

Prof. Friedrich Jodl has condensed and presented in a systematised form an enormous number of facts in the present work on psychology, which is written as a text-book for students. Professor Jodl, more than any other German psychologist, is influenced by the English school, which is commonly called the association psychology. But he has grown beyond the narrowness which marks the English associationists. He has also incorporated in his studies the results of experimental psychology, without, however, over-estimating its importance. Not the least valuable feature of the book consists in the references to the literature of the subject which are added to each chapter.

Professor Jodl defines psychology as "the science of the forms and laws of the "normal processes of the phenomena of consciousness which in the animal organ-"ism of man stand in relation to the surrounding media, the totality of which is "called psychic functions" (p. 5). In a note he adds to the word *Bewusstseins-erscheinungen*, that no language possesses an adequate word covering this term, claiming that Huxley's proposition of introducing "psychosis" had found little approbation; that "idea" had too many other meanings, and that "mind" came nearest to it while the French *esprit* is too general. We would suggest that *Bewusstseinserscheinungen* is exactly translated by "phenomena of consciousness," which, however, is quite different from "phenomena of mind," for some phenomena of mind may take place without being accompanied by consciousness. The phenomena of mind (or, mental phenomena) are the intellectual functions of man's soul, viz., arguing, and reasoning. Pain is not a mental phenomenon but a phenomenon of consciousness, while an unconscious syllogism is a mental act. At the same time we venture to say that the term "psychosis" has become quite common in English, and it is generally understood in the sense that Huxley used it.

Modern psychology practically begins with Hume who was the first to doubt the traditional soul conception that conceived of the soul as a thing-in-itself which

was in possession of its qualities and performed the functions of thinking and feeling. Hume said: "Whenever I contemplate what is inmost in what I call my own self, I always come in contact with such or such special perception, as of cold, heat, light or shadow, love or hate, pleasure or pain. I never come unawares upon my mind existing in a state void of perceptions. I never observe ought save perception." Kant followed Hume in his critical attitude and declared that the ego-conception was one of the fallacies of pure reason. Modern investigators, among them Herbart, were obliged to follow Hume and Kant, and there is at present no scientific psychologist who does not stand upon the same ground. There are a few who still try to rescue the old psychology by attacking the new psychology and branding it as a psychology without a soul, but they are no longer in the lead and must concede that their position is purely hypothetical. A great number of psychologists tried to avoid the problem and leave the question in an unsettled state, assuming the attitude of investigators and waiting for further evidence.

Jodl is not among those who withhold their own opinions, but pronounces his views without any equivocation as follows: "The sum-total of all the phenomena "of consciousness given in inner perception are commonly comprehended in the "designation 'soul,' as if soul were a substantive, and the substantial bearer of the "processes of consciousness to which they are to be referred. This is quite unob-"jectionable so long as the symbolical character of the expression is heeded, so "long as we understand the name soul to be an abbreviated term for the totality of "the data of consciousness. Every attempt to change the logical and grammatical "meaning of the word soul into an ontological one, and to conceive of the totality "of the psychic processes as a real subject which is supposed to be a substance "independent of the physical organism, distinct and separable from it, involves us "in a tangle of difficulties and must be most decidedly rejected by science. The "soul does not have states or faculties, as thinking, conceiving, enjoying oneself, "hating, etc., but all these states in their totality are the soul. It is the same with "the physiological processes which in their totality constitute what we call life, for "life neither is a separate power or substance by the side of the vital processes. In "the sense of the old soul-substance theory, the scientific psychology of to-day is "indeed a psychology without a soul, for the true object of science is the living or-"ganism, part of whose functions are the phenomena of consciousness. But for "that reason the common objection to the idea of a power which would not be the "power of a being and of an activity which would hover in the air without a sub-"stratum as unclear and contradictory, has no sense. Unclear and contradictory "is only the assumption of a soul-substance that would be independent of the living "organism" (pp. 31–32).

Professor Jodl is quite unequivocal in his statements that consciousness and life are two phases of the same process, and he adopts the so-called dual-aspect theory of a psychical and physiological parallelism, first pronounced by Clifford. He says that even the highest psychical phenomena cannot be without their physio-

logical accompaniments, and insists again and again on the close connexion between consciousness and organised life. Jodl does not, however, propose to materialise in this way the soul of man, but means to spiritualise the mechanical phenomena, finding in chemotropism and similar processes of the vegetable world, indications of psychic phenomena which form the transition from the mineral world to animal life.

The most salient feature of consciousness is, as Jodl rightly remarks, its organisation. Consciousness is never punctual, it is never an isolated feeling but always a complex of feelings, which is the necessary correlate to the physiological fact that every animal organism is a complex system of nerve-fibres and centres. When we speak of consciousness we have always to deal with a plurality of perceptions in their mutual relations (p. 95). And wherever consciousness rises into existence an organised being feels itself as a separate entity in contradistinction to the surrounding world, thus creating a condition which makes it possible to speak of inner states as opposed to external reality. This is the reason why every psychic phenomenon refers to the whole of the psychic organism, to the ego, and every elimination of the ego in this sense from the realm of psychology proves futile. For it is impossible to describe psychic states in expressions which refer merely to objects. The term spiritual or subjective always implies a relation to the ego in the sense of the psychic totality (p. 91). Thus a psychic condition without the ego is impossible and can never become a conscious state. Here of course Professor Jodl distinguishes the elementary ego such as is shared also in a vague sense by animals from the higher organised ego-idea of man.

On this basis Professor Jodl proceeds to a special treatment of psychology which embraces the second and more voluminous part of his work, and distinguishes three activities which, however, are not distinct faculties but three phases of one and the same process. He calls the condition that originates through external impressions, sensation (*Empfindung*), the commotion which internally originates from sensations, emotion (*Gefühl*), and the reaction resulting in muscular movements, volition (*Wille* or *Strebung*). Thus the entire activity of the soul is the product of two qualities, its receptivity and its spontaneity. The soul receives impressions of the outer world and reacts against them spontaneously, the intermediate condition of which is a state of psychic tension, constituting the internal life of pleasure and pain, sentiment, passion, etc. Sensation arises in response to a stimulus. Emotion or sentiment does not possess presentative value but is qualified as pleasant or unpleasant; a volition expresses the adjustment of an organism to its surroundings.

The second and special part of Professor Jodl's psychology again contains two divisions: first, he treats in Chapters IV.–VII. of the primary stages of soul-life as they appear in sensations, sentiments, and in volitions; while Chapters VIII.–XII. are devoted to a discussion of the secondary and tertiary soul processes. In the former division Professor Jodl treats the problems of psycho-physics and the activities of the various sense-organs. He discusses illusion and hallucination (IV.,

16), the qualities of sensation, intensity of sensation, etc., etc., Fechner's formula and the difference of Weber's law from Fechner's propositions, the applicability of Weber's laws and their limits (66). The first division of Chapter V. treats of the sensations of vitality, the summation of irritations, cœnæsthesis. etc. The second installment discusses the sensations of motion, entering upon and combating the idea of a sensation of innervation, etc. The third division is devoted to the sensations of the skin and its powers of localisation, and to general sensibility. The fourth division is devoted to taste and smell ; the fifth to hearing.

Here we might incidentally mention that Helmholtz's theory of *Klangfarbe* (mentioned in § 112 of Jodl's book) was first pronounced by Grassmann, and it is, to say the least, not improbable that Helmholtz knew of Grassmann's investigations but forgot to mention them when publishing the results of his own.

The sixth division of Chapter V. is devoted to seeing. Here the important problems of optic illusions of binocular vision, corporeality of the pictures of the eye, the contrast of subject and object in the act of seeing, etc., etc., are discussed with great discrimination.

Chapter VI. is devoted to the primary sensations, pleasure, pain, and perception of contrast in feelings of more or less. Professor Jodl regards both pleasure and pain as positive phenomena showing merely quantitative differences. Chapter VII. discusses the meaning and nature of volitions, as well as the conditions of attention, all subjects of importance which we could not touch upon without becoming lengthy.

The secondary and tertiary phenomena of soul-life are the result of reproduction, the nature of which Professor Jodl explains on pages 448 et seq. as the basis of all higher life.

The phenomena of memory are treated along the lines of Professor Hering's investigations. Memory is not a special faculty of consciousness, but it is a general condition of organised substance. The main deficiency in this part of Professor Jodl's book is his omission of discussing the origin of re-representative ideas or concepts. Here he follows too closely the lines of association psychology, and overlooks the importance which is produced by the fusion of memory-images of the same kind into composite pictures.

Chapter IX. is devoted to the three fundamental notions of time, space, and objective reality, as produced by the contrast of the ego and the non-ego. Chapter X. discusses the origin of speech and of thought which, according to Professor Jodl, are not identical. Here psychology comes in contact with grammar and logic, to which two special divisions are devoted (pp. 594 to 613 and 613 to 614). Chapter XI. discusses the secondary and tertiary sentiments, among them the sense of humor, wit, the comical, sense of honor, shame, sympathy, vanity, love, love of children, envy, etc., etc. The conclusion of Chapter XI. is a transition to the last chapter of the book, pointing out the superindividual sentiments and the contrast of heteronomous and autonomous morality. The problems discussed in the last chapter

on the secondary and tertiary volitions are not the least interesting of the whole book, discussing such problems as freedom of will and character-formation.

In sketching the contents of the special part of Professor Jodl's book, we regret only that we cannot enter into a further analysis of his valuable work, but if we attempted to do so we should have to write a book instead of reviewing one. That Professor Jodl's book is a most valuable contribution to modern psychology there can be no doubt, and we do not exaggerate when saying that no psychological library can be complete without it. P. C.

DIE PRINCIPIEN DER WÄRMELEHRE. Historisch-kritisch entwickelt von *Dr. Ernst Mach*, Professor an der Universität Wien. Mit 105 Figuren und 6 Porträts Leipzig: Johann Ambrosius Barth. 1896, Pages, 472. Price, M. 10.

A marked feature of recent positive research has been its alliance with philosophical criticism. The appearance of this new cast of thought was cotemporary with the renaissance of philosophical interest, which in the years succeeding the magic sway that German metaphysics held over men's minds, steadily waned before the light that the successful achievements of science spread over the intellectual world. Men had sought to scale like Prometheus of old by one fell metaphysical bound the celestial heights and to wrest by violence the secret of the universe from the hands of its heavenly keeper, only to fall back empty-handed and lamed, and to find the treasures they were seeking poured with a lavish hand from another source into the laps of their fellow creatures. Yet they had not cut their fantastic tricks before high heaven totally in vain, nor risked their glassy essence wholly to no purpose. Their feats had at least a calisthenic import. And when with the mighty onward progress of science, its concentrating of its lines of research, its probing of the last foundation-stones of knowledge, perplexities arose in the minds of inquirers at the unwonted problems confronting them and misgivings as to the right estimate of their achievements, it was found that in the despised Promethean feats of their predecessors, empty as these were in themselves and for the purposes to which they had been put, much of the method and attitude was contained that was to stand them in absolute stead in their further quests. From this dates a new era in mental inquiry.

The blending of science with philosophy and of philosophy with science now characterises the work of the best and foremost inquirers of both departments. Not that the two branches were always absolutely separated: nor that they were not in their origin (and at times in their development) identical; nor that even now they do not pursue merely different aspects of the same aim; but that, having been clearly and definitively differentiated, each is now accorded its just function and due. And wonderful fruits have grown from their union, which have redounded to the untold benefit of both. How enlightening and satisfactory philosophy is becoming, even in its mediocre representatives; how critical the verdicts of science, even in its lesser votaries! We could cite many eminent names of recent in-

quiry, both living and dead, in corroboration of our assertion; but we shall content ourselves with the instance at hand,—the name of Professor Mach, who stands in the front rank of those, who, having distinguished themselves in practical positive research, are now lending their thrice-proved powers to the elucidation of the grave and perplexing problems at its base. It is rarely given to a man to compass such signal achievements in so many departments. A professional physicist and skilful experimentalist, Professor Mach has enriched all the departments of his science, mechanics, acoustics, optics, heat, electricity, by ingenious experiments, methods, practical machines and contrivances for instruction, and notably by his critical and mathematical interpretations. His acoustic and optical experiments, and his photography of flying bullets are most popularly known here. By the side of all this, he has rendered to psychology, both theoretical and experimental, contributions which, it is safe to say, in profundity and import are more lasting and comprehensive than those upon which the fame of many eminent standard-bearers of this department rests. The same is true of philosophy and of the criticism of science. His early essay (1872) on the *Erhaltung der Arbeit* is a mine of suggestiveness, long neglected by the philosophical public, but containing in one form or other many utterances which have since become watchwords of scientific criticism The germs of his philosophical thought here presented have, along with a wealth of other new matter, been developed in his subsequent published lectures and essays, in his *Mechanics*, and in the book on *Heat* now under consideration. And all this with an exhaustless plentitude of insight into the various related sciences has been presented in a few terse volumes.

The present work on *Heat* pursues the same aim as the author's *Mechanics*. It seeks to clear up, by the light of a practical, rational theory of knowledge, the foundations of the science of thermotics and to eliminate therefrom all the superfluous notions, all the unwarranted metaphysical conceptions that have crept into it in its development. The book has a threefold character—historical, scientifico-critical, and philosophical. There are chapters on the history of thermometry, on that of the conduction and radiation of heat, on the history of calorimetry, thermodynamics, energy, etc., critical chapters on the upshot of all these subjects and on physics generally, and finally philosophical sections, discussing such subjects as Names and Numbers, Continua, The Development of Science, The Sense for the Marvellous, Language, etc. Through all there runs a humanistic trend. We shall consider the work briefly under the three aspects noted—the scientifico-critical, the philosophical, and the humanistic—giving illustrative examples of each. Some of the philosophical matter we intend translating for *The Open Court*.

The instance of scientific criticism most within the reach of philosophical readers is the author's considerations touching the subject of thermometry. The development of thermometry, beginning as did most other things in modern physics with Galileo, embraces a period of two hundred and twenty-five years (1592–1817). It began with the recognition of changes of volume as a measure of degrees of heat,

passed from air as the standard thermoscopic substance through the liquids to the solids, and after various vicissitudes, by the researches of Boyle, Mariotte, and Gay-Lussac, reverted again to air or rather to the gases, finding its culmination in the law that all thermometric substances except gases exhibit distinct individual behaviours, and in the consequent quest for a *rational* thermometric scale.

In the criterion of change of volume as a measure of thermal intensity, we have, contends our author, first a convention and second an arbitrary choice. The starting-point is the sensation of heat. That sensation of heat and change of volume should run parallel is not determined by our choice. They are two distinct elements; we know their connexion only from observation; and experience alone can tell us how far their parallelism extends. We register the voluminal changes, attach to these numbers, make the latter the substitute of thermal intensity, and pursue with respect to the *arithmetical scale* speculations which we re-apply to the real thermal states themselves, thus arriving at the idea of absolute temperature, absolute zero of temperature, etc. But absolute temperature, any more than absolute rest or motion or time, does not exist. In seeking it we are seeking a Platonic prototypal idea, seeking in reality a notion which we ourselves have hypostatised, applying results which we have reached in the development of an ordinal formal criterion to a scale of real facts for the upshot of which we have under all conditions to await the verdict of experience.

Amontons was the first to hit upon the idea of a "coldest point" or absolute zero of temperature. His idea in a modified form persists in physics to-day. It is based upon the conception that the tension of a gas is produced by its heat. For every degree increase Celsius from 0° onward the volume or expansive force of a gas increases by $\frac{1}{273}$, and *vice versa* for the decrease. The number $\frac{1}{273}$ is the coefficient of expansion of the gas. Taking $\frac{1}{273}$ away 273 times we arrive at zero volume or zero expansive force. The point —273° C. is called the absolute zero of temperature.

But if we took the coefficient of expansion of mercury, and pursued the same train of reasoning, we should reach —5000° C. as the absolute zero of temperature. And again, other methods, *a priori* equally rational, of measuring temperature, have been proposed. If we took Dalton's, for instance, using water as the thermoscopic substance and quantities of heat as the criterion, we should find —160° C., using mercury, —2021° C. as the absolute zero; mixing water and sulphuric acid we should get something between —830° and —1720° C.; and many other combinations, giving other results, are conceivable.

We have thus a multitude of "absolute zeros," all of which rest upon different hypotheses, which being substituted for the facts all give a different result. What we are doing is not studying the facts but the representations of the facts. That there is a limit in either direction to the scale of representation does not bring with it that there is a limit to the facts. The tone-sensations may be represented by rates of vibration, which being numbers have a *lower* but *no upper* limit; they

may also be represented by the logarithms of these numbers, which are unlimited in either direction (running from $-\infty$ to $+\infty$). The tone-sensations themselves, however, are limited in *both* directions. The fact is that when the tensions of a gas become zero, the indexes of the registered temperature vanish; the gas is no longer serviceable as a thermoscope; we must seek something else. In fine, experience alone can determine whether the thermal states are limited in either direction; like potential, velocity, etc., the notion of temperature is a notion of *level*, differing from the rest in that some of its levels are determinative.

Such is a skeletal abstract of Mach's criticism of the notion of temperature. We should like similarly to reproduce the discussions relating to conduction, radiation, thermodynamics, the principle of Carnot, and to the sources of the principle of the conservation of energy, but the reader may gain something of an idea of the last two points from the already published *Popular Scientific Lectures*, to which we refer him.[1]

The section on calorimetry is notable, and we catch here considerable of the author's philosophy of science, which upholds the ideal of a descriptive, phænomological formulation of the facts of the world as distinguished from a symbolical or allegorical formulation (mechanistic, substantive, etc.). Thus Black conceives the notions of "quantity of heat," "specific heat," and "latent heat," to explain the phenomena of mixed heated masses, of melting, vaporisation, etc. His procedure was sure, brilliant, and what is more marked a distinct conquest in science. Representing the masses by m, m', the changes of temperature by θ, θ', the specific heats by s, s', and latent heat by λ, Black discovered, or so pursued his quest, that the following equations were fulfilled:

$$m\theta + m'\theta' = 0$$
$$m\theta + s'm'\theta' = 0$$
$$sm\theta + \lambda m' = 0$$

In this lies his real achievement. When he went farther and pictured the above abstract quantitative expressions of the facts under the guise of substance, etc., he did more than was necessary; his symbolisation helped him but impeded his successors.

The goal of all physical research is the fulfiling of such equations, the fixing of the quantitative connexions of the things of the world by abstract mathematical signs, entirely stripped of superfluous allegorical adjuncts, and embracing in one scheme all possible cases. Such are the dynamical equations of Lagrange, and the theory of Fourier on the conduction of heat, which is here characterised as a model of physical inquiry.

We will now look at an example of the humanistic side of the work, its glimpses into the mental workshops of the inquirers. The author is speaking of Black's views of scientific research. After quoting a few passages in point, he says: "There

[1] Pp. 137-185.

"is an unmistakable echo of Newton's genius in these passages. Chemistry was "really not Black's profession. He was a professor of medicine and a busy prac-"titioner. 'He gave such unremitting attention to his patients,' says his biogra-"pher, 'that it scarcely seems possible he could have found the least time for his "other occupations.' We have here, it would seem, a partial explanation of Black's "attitude as an inquirer. There is a reason for the success which physicians and 'engineers not infrequently encounter in scientific inquiry; for in their case the "scientific training which the best of them carry into their professions, is in con-"stant contact with life and rarely impeded by the narrow views of the schools. . . . "Black is one of those rare men who win our love in all we know of them, and in "every page of their writings. The inornate, honest, pretensionless simplicity "with which he sets forth his thoughts, is reached by few. Whatever he under-"takes he seems to compass without effort. We might say of him, to use an expres-"sion often applied to the poets: 'He is a thinker by the grace of God.'"

We have similar utterances on Carnot and on the other founders of thermodynamics. Particularly good is the comparison of Joule and Mayer. In speaking of the beautiful experiments of the former, the following sentence, which will please Englishmen, occurs: "The situation with regard to Joule is the same as with re-"gard to Mayer, excepting a characteristic English trait. Sound methods of phys-"ical inquiry seem almost inborn in Englishmen, or are certainly inbred. English "inquirers are never clouded by metaphysical fogs, at least never make them the "cardinal issue. In Joule's case, every idea is put to the test of experiment, every "experiment reacts upon his ideas. The unceasing mutual adaptation of theory "and experience may be followed with great clearness in Joule's work."

We should like to quote more such passages, for the author's pages abound in them. And of the work as a whole we hope to have given a vivid, though fleeting, impression, as a masterpiece of genial inquiry which can be read by philosopher and scientist alike. No one interested in these questions should leave his mind uninfluenced by the rich, beneficent stimulus which it offers. T. J. McC.

TRAITÉ ELÉMENTAIRE DE MÉCANIQUE CHIMIQUE FONDÉE SUR LA THERMODYNAMIQUE. Par *P. Duhem*, Professeur de Physique Théorique à la Faculté des Sciences de Bordeaux. Tome I. Introduction. Principes fondamentaux de la thermodynamique. Faux équilibres et explosions. Paris: Librairie Scientifique A. Hermann. Rue de la Sorbonne, 8. 1897. Price, 10 francs.

The present book scarcely falls within the line of the work of *The Monist*, but as the principles which it employs, the theories which it develops, are now in the foreground of scientific criticism, and as the position of its author as one of the first of living theoretical physicists makes it a standard authority on its subject, we cannot pass it by without some slight reference and without the full measure of commendation. The work will embrace two volumes. The first, which is now just out, expounds the preliminary analytical and mechanical notions employed in the

study of chemical thermodynamics, develops the general physical principles of the same science, notably in their bearing upon chemistry, and finally, in its consideration of false equilibria and of explosions, enters into the detailed application of the foregoing theoretical parts. The work is predominantly mathematical, but for its subject is simple and not wanting in æsthetic qualities, to which the outward labors of the publishers have added a welcome and agreeable typographical emphasis. Duhem's treatise aims at marshaling in compact and systematic form all the main results of mathematical physical chemistry, which hitherto have largely lain scattered and isolated in scientific reports, and so forms an indispensable work for the scientific library. T.

HISTOIRE DE LA PHILOSOPHIE EUROPÉENNE. Par *Alfred Weber*. Sixième édition. Paris: Fischbacher. 1897. Pages, 500.

HISTORY OF PHILOSOPHY. By *Alfred Weber*, Professor in the University of Strassburg. Authorised Translation by Frank Thilly, A. M., Ph. D. From the Fifth French Edition. New York: Charles Scribner's Sons. 1896. Pages, 630.

LEIBNIZENS STREIT GEGEN LOCKE IN ANSEHUNG DER ANGEBORENEN IDEEN. Von *Frank Thilly*. Heidelberg: Universitäts-Buchdruckerei von J. Hörning. 1891.

France is not as rich in histories of philosophy as Germany, and it is remarkable that the author of this most scholarly and comprehensive work on the History of Philosophy is an Alsatian who had the advantage of passing through French as well as German universities, and has combined in a happy alliance the advantages of both.

Alfred Weber is a descendant of one of the old Alsatian families which were mentioned centuries ago in the chronicles of the free city of Strassburg. He was Professor at the University of Strassburg while Alsace was still in the possession of France. When the Germans seized the country he remained in his position and is at present still there as head of the Philosophical Department.

During his younger years, Weber was powerfully attracted by the religious philosophy of Schelling who was one of the apostles of a monistic conception of the world on the basis of natural science,—not in a narrow sense of the so-called physical sciences which would exclude a due consideration of the more significant branches of anthropology and psychology, but in the broadest sense of the word nature. Weber was also influenced by Hegel, but he never allowed himself to become a blind follower of the philosophy of the Absolute. After a study of Schopenhauer's works, Weber wrote a little pamplet in which he embodies his criticism of the great pessimist by emphasising that the will to live with the growth of civilisation changes into a will to realise the good. Schopenhauer has utterly neglected in his system of thought this will to realise the good, and yet how much more power-

ful does the latter grow in the course of evolution than the former, for we even find people who do not believe in an immortality of the soul, willingly sacrificing their lives for the sake of their ideals.

In accordance with this latest development of Weber's views, the Alsatian philosopher views religion as a will to realise eternal life. He finds at the very beginning of the religious evolution of mankind that the religious sentiment originates on account of death. Man witnesses the death of his dear ones, and he comprehends that death is the common fate of all, including himself. Religion is the natural reaction which the thought of death produces in man, and this is and remains its characteristic feature from the beginning to the present day. It shows itself in the superstitions of the savage as well as in the confessions of faith of all the various religions that now prevail upon earth. Everywhere the immortality idea is uppermost, and without it there would be no religion.

These two pamphlets on the will to realise the good, and on religion as the will to realise eternal life, are written in German, the mother-tongue of the Alsatians, while all the other books of Professor Weber are composed in French, the language of his early education. In spite of the small size of his German pamphlets, they embody the most salient and important thoughts that characterise Professor Weber's philosophy.

As to Professor Weber's History of European Philosophy, we can only recommend it to the student of philosophy, in justification of which we simply point to the fact that it has reached its sixth edition. The book has been well received in Germany as well as in France, and we dare say it is one of the standard books which in many respects compares favorably with Erdmann and Ueberweg, and I would not hesitate to give it preference over more modern German works in the same field. The book is not overloaded with professorial paraphernalia; *non olet cathedram.* The absence of footnotes and other learned apparatus so conspicuous in German works will be a pleasant feature to many readers. References to the sources are not omitted, but they are reduced to the utmost, and partly woven into the text, which renders the book a remarkable combination of French elegance and German thoroughness. The style is limpid and presents scarcely any difficulties even to foreigners who possess only the ordinary reading knowledge of French. The résumés of the various philosophical systems are complete and yet brief. Nothing of importance is omitted, and nothing is treated at undue length. Modern philosophy and also its development on American soil is not included in the scheme of this book. Darwin and the contemporaneous monism, together with the French positivism and the German neo-criticism are only briefly mentioned; and in the conclusion of his work Weber merely suggests his views of the great agreements that obtain among all philosophies. They consist in the recognition of reason, the postulation of an essential unity of all things, the observation of the universality of struggle, of effort, of will, and of conscience, the affirmation of the moral ideal which is the ultimate aim of the creative efforts and the cosmic becoming. Thus,

nature is development, the infinite perfectibility of which forms at the same time its impulsive force and its highest goal.

The print of the book is clear and pleasant, and it is a pity that after the fashion of European books it contains no index, which will be missed, especially by American readers.

* * *

Professor Weber's *History of Philosophy* has been translated into English by Frank Thilly, Professor of Philosophy in the University of Missouri, because the latter deems it "the most serviceable manual thus far published." He sums up his view of the work as follows: "It begins as simply as the history of philosophy "itself, and gradually introduces the reader to the complex problems of modern "thought, to which it devotes more than one-half of its entire space. The portions "dealing with Kant and his successors are particularly admirable. The clear and "comprehensive exposition of the Hegelian philosophy will greatly assist the stu-"dent in his endeavors to understand that much abused system. And the modern "theory of evolution, which has revolutionised the thought of our century, and "which is barely mentioned by Falckenberg and Windelband, surely deserves the "attention and criticism it here receives."

Professor Thilly's translation is in every respect admirable. It is not slavishly literal, but it shows an independent mind which considers the needs of the reader and adds several helps which greatly increase the value of the book. The translalation is made from the fifth edition, but since Professor Weber has communicated to the translator the changes and additions he intended to make, it is as good as if it had been made from the sixth edition, which has in the meantime appeared. We have not been able to discover a difference of any importance. Professor Thilly has added brief references, especially to American and English publications, which are not mentioned in the original, and has also added an exhaustive index of eighteen pages, which, at least in the opinion of Americans, is indispensable to any work of over six hundred pages, and especially to a book that is used both as a textbook and for reference. It seems that any one who would desire to use the original could do it better by first referring to Professor Thilly's translation. There can be no question about that, that as a text-book for philosophical students in English and American universities Weber's book in Professor Thilly's translation is highly recommendable.

* * *

The translator of Weber's *Histoire de la philosophie* took his doctor's degree several years ago at Heidelberg on the ground of a very creditable dissertation treating in a purely historical manner the controversy of Leibnitz *contra* Locke concerning innate ideas. It is one of the most important phases of a struggle that is still to be fought out in philosophy. There is on the one side rationalism, represented by Descartes, Spinoza, Leibnitz, Wolf, and on the other side empiricism, represented by Bacon, Locke, and Hume. The question is, Are there innate ideas

or not? Descartes says, There are; and Locke denies the existence of innate ideas; while Leibnitz in criticising Locke's position accepts but modifies the doctrine of innate ideas. Locke considers mind in its original state as a *tabula rasa*, and declares: *nihil est in intellectu quod non antea fuerit in sensu;* and "being in the intellect" is, in Locke's opinion, being conscious of an idea. Leibnitz concedes that conscious ideas are not innate. Yet if all knowledge rises from the senses, how can we have any conception of necessity. Necessity is to Leibnitz the test of innate ideas, and innate ideas are no longer to him conscious thoughts but dispositions of the mind, *Anlagen;* he accepts Locke's position: "*Nihil est in intellectu quod non antea fuerit in sensu,*" but he adds, "*nise ipse intellectus.*"

Thilly discusses first the relation of Locke to Bacon, then that of Locke to Descartes, and finally Leibnitz's case against Locke. Here he leaves the question without adding any opinion of his own, showing throughout the fairness and impartial exactness that should always distinguish the historian.

The subject being of extraordinary interest we feel tempted to add a few remarks. We should say that Locke's criticism of Descartes was in one main point just: Locke was right in denying the existence of innate ideas. Yet Locke misunderstood Descartes's position. Descartes contrasts sense-perception and thoughts or ideas—a distinction which was never made by Locke. Sensations are impressions; they are not yet knowledge; they are different from ideas or pure thoughts (noumena), and cognition is possible only through thinking; and as Descartes sees no possibility for certain ideas to originate from sense-experience alone, he assumes that some ideas are innate. Locke makes no distinction between sense-impressions and thoughts. He calls both "ideas." Thus it was natural that in spite of the justice of his criticism, he did not succeed in overcoming Descartes's proposition. If the mind was a *tabula rasa*, then there was after all something innate; there was nothing written on the primitive mind, but something can be written on it. This would have been the consistent conclusion, and this was indeed in the main Leibnitz's position.

Have later philosophers left the question in this dilemma? It almost appears so, for in spite of Kant, both schools are still represented to-day. The innate ideas of Leibnitz and the *tabula rasa* of Locke are now called the ego, the monon, the self, the soul, and other mystical names.

In our opinion, there is no such a thing as a mind that is a *tabula rasa*. The problem is not, How come ideas into the mind? but, How does mind originate? Mind and ideas are not two things; they are inseparable. No mind without ideas, no ideas without a mind. In other words, mind is a systematised union of ideas; mind is a commonwealth of thoughts; and among the ideas that people our mind, there are some which do not rise from sense-impressions; these are the conceptions of the formal sciences. The question therefore is, How do the ideas of formal thought originate? An answer to this question shows that the commonwealth of ideas—the mind—possesses some constitutional forms through which sense-impressions are worked out into cognition. These forms originate from and grow with

experience. They are an expression of the same forms that condition the order of the objective universe. The presence of these forms changes sensations into ideas or thoughts, and thus makes of a sentient being a thinking mind. Sensations are presentative feelings; ideas are representative. Alone through these forms, which are formulated in mathematics, logic, etc., a mind conceives the idea of necessity which cannot be deduced out of the mere data of sense-experience. Cognition is possible only through a constant reference to these forms and formal systems. Leibnitz is therefore right that there is in every mind not only that which came into it through the senses but also the mind itself, viz., that something which represents the relations among the sense-impressions; there are the categories in which they are arranged and also the systems of pure forms which are abstracted from such arrangements. Yet the fact that these mental forms are constitutional does not render them innate or mystical. That element of experience which produces them is a universal feature of reality; it is form. The idea of necessity is nothing but the universality of the law of sameness that has become conscious. P. C.

NEW ESSAYS CONCERNING HUMAN UNDERSTANDING. By *Wilhelm Gottfried Leibnitz*. Together with an Appendix. Translated by Alfred Gideon Langley. New York and London: The Macmillan Co. Pp. 861. Price, $3.25.

The students of philosophy who go to the sources for their knowledge and are not content to rely wholly upon historical expositions, will welcome the present work containing the New Essays of Leibnitz. The translator, Mr. Alfred Gideon Langley, has performed his arduous task carefully, and supplied to the text a vast volume of bibliography and biographical notes, which, with the original matter itself, have swelled the book to 861 octavo pages. In the face of this fact it is well that the translator did not incorporate his intended "Introduction on the Philosophy of Leibnitz" in the work. The book is a translation of the entire fifth volume of Gerhardt's edition of the philosophical works of Leibnitz, including Gerhardt's brief introductory remarks of nine pages—matter which, being partly Latin, partly French, and partly German, has never before in its entirety been translated into English. The contents of the volume are too well known to philosophical students to need restatement, and we shall only say that the four books of which they consist treat: (1) of innate ideas; (2) of ideas; (3) of words; (4) of knowledge. The appendix, besides notes and introductions, contains the letter of Leibnitz to Jacob Thomasius on the history of philosophy, one or two fragments, an essay on atoms and on the origin of things, and most important of all the essays on dynamics which constitute the body of Leibnitz's share in the great controversy of the eighteenth century on the measure of force. It is important to know that these essays are contained in this volume. The indexes are unusually full and complete, and great care seems to have been exercised in all points of textual criticism. Upon the whole, we have a useful work, rendering a distinct service to the literature of philosophy. μ.

SYSTEMATISCHE PHYLOGENIE DER WIRBELLOSEN THIERE (INVERTEBRATA). Von *Ernst Haeckel.* Zweiter Theil. Berlin: Georg Reimer. 1896. Pages, 720. Price, 17 M.

The readers of *The Monist* are perfectly familiar with the character of Professor Haeckel's present work, the first and third parts of which we reviewed on their original appearance (see *The Monist*, Vol. V., p. 451, and Vol. VI., p. 311), so that we have now merely to note the publication of the second part which treats of the phylogeny of the invertebrates. The entire work is now complete. It is marked by the same qualities as all of Professor Haeckel's books,—lucidity of style and breadth of view; and when we remember that the vivid hypothetical picture which the author here offers of organic ancestral history is the net result of thirty years of hard, fruitful labor in this domain, we can approximately grasp its worth and import. Professor Haeckel's indefatigable pen is never idle, and we have also to record the publication of a large quarto brochure of 177 pages on the phylogeny of the Echinoderms, with many handsome plates (*Die Amphorideen und Cystoideen* Leipsic, Engelmann). *μ.*

SOCIOLOGIA E FILOSOFIA DEL DIRITTO. By *Lorenzo Ratto.* Turin: Unione-Tipografico-Editrice. 1894. 8mo, pages, ix+178.

STATO E LIBERTÀ: SAGGIO DI SCIENZA POLITICA. By *Lorenzo Ratto.* Savona: A. Ricci. 1890. 8mo, pp. xii+118.

These two volumes cover in part the same ground. In the preface to the first we are told that in it are summed up the results of various investigations which may be published later on. Its seven chapters are devoted to the following subjects: The relation between philosophy and science, social philosophy, the conception and limits of natural sociology, the sociological problem, the crisis of the philosophy of law, and the task of juridical sociology. The second volume considers the natural formation of the state, the state as a living organism, and liberty as the foundation of juridical and political institutions. Both volumes are valuable contributions to the modern task of clearing up the conceptions of the branches of knowledge they discuss, and the relation of these branches to other disciplines.

Especially interesting is the author's conception of sociology. In this country the drift of expert opinion on the question as to whether sociology is a philosophy or a science seems to be toward the conviction that it is a correlating and co-ordinating philosophy. Dr. Ratto, however, while granting the existence and importance of a social philosophy, called by him sometimes general sociology, maintains that there is also a place for a science of sociology. Philosophy, which he limits to the consideration of concepts and problems not peculiar to any science but common to all, he divides into three sections corresponding to the three groups of sciences—Cosmology, Biology, and Sociology The last of these groups he divides into three sub-groups: natural sociology, moral sociology, and political sociology. Natural sociology includes a group of sociological sciences not yet carefully distinguished,

such as pure sociology, which should investigate the laws of the formation and evolution of the social organism, its physiology, psychology, etc., and "all the sciences contained in embryo in modern sociology." Moral sociology embraces the social sciences, moral and historical, and political sociology includes juridico-political sociology, which he thinks should take the place of the philosophy of law, and all the juridical and political sciences (*Sociologia e filosofia del diritto*, p. 13) We thus see that according to his view general sociology or social philosophy is a synthesis of three groups of sciences, one of which includes the science of sociology. To the conception and limitations of this science he devotes a chapter.

Inasmuch as the principal task of the science of sociology is, according to Dr. Ratto, the determination of the nature of the social organism, it is not surprising to find him denying to Comte the honor of being the founder of sociology and bestowing the same upon Espinas, who sought an answer to the question, "What Is Society?" by a careful study of animal societies. The limitation of sociology to the study of human societies is, according to our author, a relic of the old anthropocentric idea. It is only by going back to sub-human social life that we may hope to discover the origin and nature of society. From the lowest form of animal society to the most highly complex human society of to-day the line is as unbroken as it is from protoplasm to man.

It may be thought that the conception of sociology here outlined is open to the criticism that there is no distinction between sociology and biology. Dr. Ratto considers this criticism and shows that it is invalid. He admits that these sciences are closely related. Biology, however, studies the individual, while sociology studies the group. Between the group and the individual there are fundamental distinctions. To say, as Fouillée does, that every individual is a society and every society an individual, is an abuse of language (*stato e liberto*, p. 49). But even if this were true biology studies only those societies in which the units do not constitute individuals physiologically distinct or distinguishable (p. 57).

While many will not admit that the argument of Dr. Ratto in favor of a new science is convincing, all will agree that his discussion is one of the ablest that has thus far appeared. Many indeed are disposed to regard all attempts to define and limit sociology as premature. A science, like almost everything else, is a growth. If sociology is really a science we need have no fear that it will reveal itself as such as it develops from the embryonic stage. Our chief present concern should be to collect material. Until there is a residue of facts of sufficient proportions to engage our attention we cannot be sure that there is need or room for a science.

Something should be said in regard to the conception of the philosophy of law which is expressed in these volumes. A few words from the preface of the former volume will perhaps make it clear. "The principal point," says Dr. Ratto, "to "which I would call the reader's attention, is the attempt at a division of the old "philosophy of law, galvanised by the actual philosophic movement, into two new "and quite distinct sciences, one of which may still be called the philosophy of law,

"although the name is not appropriate, and which has for its object the investiga-"tion of juridical ideals and the laws of their realisation; the other called juridical "sociology, a name equally inappropriate but not easily improved, which has for "its object the new studies upon the natural formation and evolution of juridical "and political phenomena."

These volumes and others which have lately appeared in Italy illustrate a fact not well enough known in this country, and that is that Italian thought on sociological subjects is abreast of that in any other country. I. W. HOWERTH.

THE THEORY OF KNOWLEDGE. A Contribution to some Problems of Logic and Metaphysics. By *L. T. Hobhouse*, Fellow and Assistant-Tutor of Corpus Christi College, Oxford. London: Methuen & Co. 1896. Pages, xx, 627. Price, 21 shillings.

Mr. Hobhouse thinks the time has arrived for an attempt to fuse what is "true and valuable in the older English tradition" with the newer doctrines of Lotze and Hegel. We shall limit ourselves to giving our readers a general idea of the contents of the book, which we may say at once is deserving of careful study.

In his Introduction the author tells us what he understands by philosophy. This is a synthesis of the sciences—"of all that is known, and . . . of much also that is only felt or hoped." To this synthesis the theory of knowledge contributes only one element, that which concerns "the conditions of genuine knowledge and of certain broad aspects of the results or tendencies of knowledge which seem to be bound up with any just conception of its conditions." The subject is highly complex, and that the reader may have a guide to the line of thought pursued, the author begins his work by pointing out, that in regard to any statement whatever three questions may be asked—as to the grounds on which it is made, its meaning, and its truth—and that these questions deal respectively with the conditions, the contents, and the validity of our knowledge as a whole. The discussion of the subject follows these lines.

The work is divided into three parts, the first of which treats of the *Data* with which the theory of knowledge is concerned. Chapter I. deals with Apprehension, used in the sense of sensation or perception, which is the starting point of knowledge. Its content is fact, within which may be included space and time, as well as qualities and relations. Memory, and Construction, which appears first as "memory-synthesis," and is based on comparison operating by analysis or abstraction, engage attention in the next two chapters. The remainder of Part I. is devoted to a discussion of particular and general Ideas, Resemblance and Identity, and of the nature and different kinds of Judgment, which the author speaks of as the acceptance or assertion of an idea "involving a suggestion of, or reference to reality. In the chapter treating of "The Validity of Judgment" he considers the objections to categorical judgments. Here he concludes that space and time are not proved unreal by infinite divisibility or infinite extent. Part II. of Mr. Hobhouse's work deals

with the theory of Inference, under the heads of Imagination, Inference, Probable Reasoning and Induction. The chapters on Numerical Probability, Scientific Induction, The Interconnexion of General Truths, and Constructive Generalisation are of especial interest. Under the head of "Explanation" the author treats fully of the relation of cause and effect, which he describes as forming "one process or stream of existence passing before us." Classification has to do with general attributes and relations, as opposed to explanation, which is concerned with universal laws and their relations, and hence is the ideal of science.

The third part of this exhaustive work is concerned with the subjects of the Validity and Reality of Knowledge, and it deals with many important questions. Knowledge is declared to be valid as a system of judgments connected by valid methods, and the principle of validity itself is guaranteed by the system which it forms. In the chapter on External Reality the thing-in-itself receives attention, and the conclusion is arrived at that apprehension is of outer objects. The next chapter deals with Substance, and the subject is discussed under two heads, "that of the unity of various attributes in the thing, and that of the permanence of substance in the midst of qualitative changes." This leads to a consideration of the Conception of Self, which the author, distinguishing self from subject and from the ego, seems inclined to regard as the substantial whole to which consciousness belongs, although "the ultimate substance to which consciousness is referable remains doubtful." In his concluding chapters Mr. Hobhouse argues that Reality is an interconnected whole, probably organic, and he affirms that knowledge is relative only in the sense of being partial and inadequate, and that our conception of the whole grows constantly less inadequate. Careful consideration is given to the subject of variability, which is said to be "determined by the constructive necessities of the whole to which they belong." Finally, Logic is a hypothetical reconstruction of knowledge, and the function of Philosophy is declared to be the interpretation of reality by a synthesis of knowledge in which is included the "truth of feeling.'

C. S. W.

DIE ENTWICKELUNG DER GEHIRNBAHNEN IN DER TIERREIHE. *L. Edinger.* "Allgemeine Medicinische Central-Zeitung," 1896, No's 79 and 80.

In this recent address before the Sixty-Eighth Assembly of German Naturalists and Physicians Professor Edinger has so concentrated our present knowledge of nerve-evolution that it would be impossible to crystallise in a short review all that is contained in his admirable and suggestive lecture. We may, however, call attention to two or three points on which Dr. Edinger lays special emphasis.

Although dealing principally with the nervous mechanism of vertebrates, he rightly claims that the operations of these complex structures cannot be understood without studying lower organisms. And to this work he strongly insists that the investigator shall bring no prejudices; that he shall apply no anthropopsychic units of measurement; that he shall not describe the wriggling of a worm nor the closing of

a clam's shell in the terminology of human psychology. This is emphasised by reference to Dr. Jacques Loeb's work on the sea-anemone, a pouch-like animal having at one end a mouth surrounded by tentacles. The animal possesses no definite nervous system. If one touches these tentacles with a piece of meat, they seize the morsel and press it into the mouth. If paper is offered, they do not take it. The tentacles seem, therefore, to exercise discrimination in the selection of food. As one observer puts it, "the actinia tastes." But Professor Loeb has shown in the clearest manner that no such interpretation is allowable. He was able by certain operations to cause the development of tentacles on parts of the body far from the mouth. These appendages could be of no possible use in the taking of food. Yet they exhibited the same selective power as those around the mouth. They took the meat and strove to push it through the body wall. They likewise rejected the paper. There was no indication that the animal understood the uselessness of the operation. The act of food-taking must, therefore, be attributed to chemical stimulation of the contractile tentacles. The animal no more tastes than does our stomach when peristaltic motions of its walls are aroused by the presence of food.

The savage declared that there must be a horse inside the locomotive. So we have put a man into every moth that seeks the light, every snail that withdraws into its shell, every worm that squirms and wriggles. It is "curious"! It "fears"! It "feels pain"!

The truth is we know almost nothing of the sensations of invertebrates. We do know that they lack wholly the apparatus which in the higher animals is associated with consciousness, and we are not justified in describing them in terms which imply the possession of mental powers or human sentiments.

Professor Edinger also cites the experiments which show that the crawling of an earthworm is a purely reflexive response to peripheral stimulation. Locomotion, although apparently adapted to the creature's welfare, is not an expression of consciousness. Dr. Edinger points out how well the experimental evidence of this fact, worked out by Friedlander and Loeb, is corroborated by the nervous structure of the earth-worm as described by G. Retzius.

The case of the worm is but one of many familiar instances illustrating how a sensory stimulus may, by proper apparatus and without conscious will, lead to an extensive series of complex co-ordinated motions. Edinger believes that this principle has wide application in the animal kingdom. In vertebrates it would explain those activities of which the spinal cord is the special centre. All the motions of the acraniate Amphioxus, the apparently purposeful reflexes of brainless frogs and the perfect swimming of brainless ducks are cases in point. That all of these are comparable with the crawling of the worm is proven not only by a comparative study of the phenomena themselves but also by the structure of the spinal cord, which, in so far at least as it is an independent centre, is but a complex variation of the principles of architecture found in the nervous system of worms. This may

be taken as the first proposition demonstrated by the methods of comparative anatomy and comparative physiology.

His second theorem is that everything brainward of the spinal cord is a later development, and that the evolution of psychic functions is in direct proportion to the evolution of the cerebral cortex and its associative fibre-tracts. By a series of examples and a comparative study of each part of the brain, he shows how nearly this proposition is capable of demonstration at the present time. Concerning the medulla, cerebellum, midbrain. etc.—in fact all parts of the encephalon except the cortex and its association apparatus—the evidence adduced shows either a constant structure throughout the vertebrate phylum, as is the case with the midbrain, or else a development not regular nor proportioned to the height of an animal in the natural scale, but rather in accordance with its habits of life. An example of the latter condition is the olfactory apparatus, which is highly developed in the fishes, but is reduced to a minimum in the advanced group of birds.

In the cortex, however, we have an apparatus in comparison with which all other parts of the nervous system have undergone only minimal changes. From small beginnings, to be sought among the Selachians, have come the great hemispheres of the human cerebrum. Most important of all, the evolution of mental power has kept pace with the development of this part of the brain. While simple motions and the primary valuation of sensory impressions are accomplished throughout the vertebrate series by substantially the same apparatus, the higher associative faculties come only through the cerebral cortex. All the best evidence of physiology, histology, and pathology, points to this conclusion.

Tracing the evolution of the cerebrum Professor Edinger points out that, for the earliest cortex, connexion with the taste apparatus alone can with certainty be made out. "As the case stands now," he remarks, "we must consider the cortex as primarily a centre which with all its associations served the sense of taste." This first function can be traced throughout the vertebrate series, although somewhat doubtfully in birds. In the course of evolution other parts became connected with the cortex, and with each addition came enlargement of the psychic powers. This fact is illustrated by the cortical connexions of the optic nerve, which have been more thoroughly investigated than any other. In the fishes the optic fibres end in the roof of the thalamus. The same is true of the young of all animals including man.

> "The baby new to earth and sky,
> What time his tender palm is prest
> Against the circle of the breast,
> Has never thought that this is I."

He sees, but does not understand. He preserves no connexion of sight impressions. At the age of two months, however, at the very time when examination of the brain shows the development of the fibres connecting the midbrain with the cortex, the child begins to acquire sight experiences. He

"Finds 'I am not what I see,
And other than the things I touch.'"

The lower vertebrates never develop these cortical tracts, and just so surely their vision remains of a primary character. A hungry snake will crawl over a mouse without noticing it, provided the "tim'rous beastie" keeps still. It will swallow a dead mouse if the latter is kept in motion. But in the birds, where the primary optic centers first acquire connexions with the cortex, we find an entire change of mental power. Many experiments and observations show that the feathered world understands what it sees and associates therewith its earlier sight impressions.

It should not be overlooked that with the evolution of the cortex proper there is found a parallel increase of associative mechanism. As Professor Edinger states it, "Nothing characterises the mammalian brain more than the development of numerous and massive association tracts along with increase of the cortex." And here again mental evolution goes hand in hand with that of anatomical structure. Sense and substance, faculty and fabric, mind and matter are parallel and inseparable.

It will therefore be seen that the great authority of Professor Edinger is thrown with those who believe that differences in mental endowment imply differences in cerebral structure. In regard to what these differences are and in regard to the localisation of psychological functions in the cortex, he acknowledges the meagerness of present knowledge, admits the inadequacy of methods hitherto employed and shows clearly how the anatomical difference essential to a great quality of mind might exist in a given brain without its being perceptibly altered from the average in weight, shape, or convolutions. On this point he cites strong evidence and suggests interesting lines for investigation.

He further expresses the belief that the brain is a progressive development; that "no boundaries can be drawn between the mental possessions of the lowest and the highest vertebrates;" and finally that the evolution of the human brain and human intellect has not yet reached its maximum. E. P. LYON.

KULTUR UND SCHULE. Präliminarien zu einem Schulfrieden im Anschluss an die Preussische Neuordnung von 1 April 1892. Von *Dr. Alex. Wernicke.* Osterwieck: A. W. Zickfeldt. 1896. Price, M. 2.40.

The pamphlet is a protest against the narrowness of those educators who would give all advantages to the gymnasial course and deprive the *Realschulen* even of the privileges which have reluctantly been conceded to them in Germany. The author is a man of serious convictions fighting for a noble cause. A discussion of his expositions would be out of place here, because whatever the school problems may be with which we are confronted in English-speaking countries, there is little danger of tyranny on the part of classical philologists.

ADAM SMITH'S PÄDAGOGISCHE THEORIEN IM RAHMEN SEINES SYSTEMS DER PRAKTISCHEN PHILOSOPHIE. Von *Dr. phil. Paul Bergemann*. Wiesbaden: Emil Behrend. 1896. Pages, 64. Price, M. 1.20.

Adam Smith's theories of political economy are well known while his views on the subject of education are neither remembered nor recognised. Dr. Bergemann therefore calls attention to Adam Smith's pedagogical propositions, which are treated in several chapters of his *Inquiry Into the Nature and Causes of the Wealth of Nations*, and sheds light upon their significance by setting them forth in their historical connexion and contrasting them with the views of other contemporary thinkers.

The editors of the *Vierteljahrsschrift für wissenschaftliche Philosophie* propose a prize of five hundred marks for the best solution of the following problem:

"Nachweis der metaphysisch-animistischen Elemente in dem Satz von der Erhaltung der Energie und Vorschlag zur Ausschaltung dieser Elemente."

The essay must be written in German, but competition is not limited to any nationality. Size should not exceed fifty or sixty pages of said magazine. Latest term, October 1. Address the editors of the *Vierteljahrsschrift*, Privatdozent Dr Fr. Carstanjen, Zürich V Englisch Viertel 49, or Dr. O. Krebs, Zürich V Minervastrasse 46.

Instead of the author's name each essay is to be superscribed by a motto. An accompanying envelope, also superscribed by the motto, is to contain the author's real name and address. The judges will be: Prof. Dr. Ernst Mach, of Vienna Prof. Dr. Alois Riehl, of Kiel, and the two editors of the *Vierteljahrsschrift*.

Mr. Thomas J. McCormack, the translator of Prof. Ernst Mach's *Mechanics* and *Scientific Lectures*, and of numerous other scientific works offering great difficulties to reproduction in English form, has been connected with The Open Court Publishing Co. since the foundation of *The Monist* and has rendered the editor much valuable assistance both in the reviewing of books and in the general supervision of the editorial work. Beginning with the April number he will be more closely associated with the staff of both *The Monist* and *The Open Court* in the capacity of assistant editor.

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THE MONIST.

ON EGG-STRUCTURE AND THE HEREDITY OF INSTINCTS.

THE INSTINCTIVE ACTIONS of animals are hereditary and can only be transmitted through the sexual cells. The problem of heredity from the physiological standpoint is, in brief, as follows: How can an egg, a simple vesicle filled with a viscous liquid which contains some solid constituents, be the bearer of such complicated mechanisms as the hereditary instincts? Two views are possible *a priori:* either the simplicity and homogeneity of the egg is only an illusion, and in reality it contains an invisible mysterious structure, of a similar degree of complexity to the adult animal; or the complicated mechanism of the instincts is the result of very simple circumstances which do not require any complicated structure for their transmission through the egg. All other possible suppositions are only compromises between these two possibilities. We shall here briefly present an argument in favor of the latter solution, which, we hope, will do away with some of the mystic aspects of heredity, and render a number of very complicated, albeit ingenious, theories redundant.

I.

The first view, which has been of late very ably expounded to the readers of *The Monist*, is held, among others, by Nägeli and Weismann; not so much, however, for the sake of accounting for

the heredity of instincts as for the explanation of the continuity of forms in general. As the mysterious egg-structure which this theory presupposes is admittedly invisible, it is impossible to prove directly its non-existence. To the second view we are necessarily led when we attempt to analyse the instincts into their elements, which will deprive them of much that seemed very mysterious before. A few salient examples will be sufficient to throw a new light on the subject.

1. The larvæ of a certain butterfly (*Porthesia chrysorrhea*) hatch in Germany in the fall and hibernate in large numbers in a web on trees and shrubs. The warm spring sun drives the larvæ out of their nest, and they creep upward on the branches of the tree until they reach the highest points, where they find in the young buds their first food. As soon as they have eaten, they creep down on the branches until they find new buds or leaves which in the meantime have appeared in abundance. It is apparent that the instinct of the caterpillars to creep upwards after they awake from their winter sleep saves their lives. If they were not guided by such an instinct, those that crept downwards would perish from lack of food. How can such an instinct be transmitted by a single cell?

Experiments which I made eight years ago prove that the young caterpillars of Porthesia, as long as they are starving, are oriented by the light, i. e., the light causes them to bring their plane of symmetry into the direction of the rays of light, and to turn their oral pole toward the source of light. This process is purely mechanical. The light produces in the skin of the animal a change (probably chemical), and this produces, through the central nervous system, changes in the tension of certain muscles. Suppose the light falls upon the right side of the animal. This would lead to an increase in the tension of the muscles which turn the head and body of the animal to the right. As soon as the head of the animal is turned towards the source of light and its median plane is in the direction of the rays, the symmetrical points of the surface are cut by the rays of light at the same angle, and the chemical effect of the light is the same in each pair of symmetrical points of the surface of the animal. Correspond-

ingly, the symmetrical muscles of both sides of the body are under equal tension, and there is no reason why the animal should deviate more towards one side than towards the other from the direction of the rays of light. Thus the animal goes towards the source of light. I may mention here, by the way, that this is also the mechanism by which the moth is forced into the flame. There is no such thing as an attraction of the moth by the light, but its fatal flight is only due to an orientation. We call those animals that are forced to turn their heads towards the source of light, and that consequently go towards the source of light, positively heliotropic.

Positive heliotropism of the young caterpillars of Porthesia leads them to the tips of the branches where they find their food. During the cold of winter they are rigid and immovable, the higher temperature of spring produces chemical changes in their bodies which causes them to move. The direction of motion, however, is dictated by the light. In the open air, where the light of the sky falls from all sides upon the animals, we may decompose each ray of light into a horizontal and vertical component. The horizontal components annihilate each other, and only the effect of the vertical component will remain. The animal, therefore, on account of its positive heliotropism, must creep upwards until it reaches the tip of a branch. Here it is held by the light. The chemical stimuli which are given to the animal by the young buds, determine, in a machine-like way, the feeding motions.

From these data we are able to answer the question, how much of a structure must be contained in the egg of Porthesia, in order to render possible the heredity of this curious instinct of the young caterpillars? The answer is, the egg must contain, first, a substance which is sensitive to light. This is possible without any complicated structure, even if we assume that the egg is only a mixture of different unformed substances. But this is only one of the elements which determine the positive heliotropism. The second circumstance is, as we have seen, the bilateral symmetry of the animal. For the transmission of the instinct, this, too, must be determined by the egg. This makes it necessary that a difference of the ventral and dorsal, of the oral and aboral pole is already

intimated in the ovum, or originates early during the development. An unequal distribution of the substances of the egg would suffice to bring about this peculiarity.

But we have seen that the same larvæ, as soon as they have eaten, leave the tips of the branches and creep downwards. Why does the light not hold them permanently at the highest point of the branches? My experiments showed that the caterpillars of the animals are heliotropic only as long as they are starving, while they lose their heliotropism as soon as they are fed. This is not the only observation of this kind, for I have found a series of facts which show that chemical changes influence the irritability of the animal towards the light. We may imagine that the taking up of food either leads to the destruction of the substances which are sensitive to light, or leads to changes which inhibit their action. Thus the analysis of the curious instincts of the caterpillars of Porthesia does away with all complications, which might very easily lead to the assumption of mysterious structures in the egg.

2. While in this case, the external circumstances lead the young offspring to the feeding places, there is a second class of instincts in which the female deposits its eggs at places where the hatching larvæ find their food. A simple example of this group of instincts is the deposition of the eggs of the common fly. They lay their eggs upon putrefying meat, or cheese, and these substances are the material upon which the young larvæ of the fly feed. I have often made the experiment of putting pieces of fat and of meat from the same animal side by side in front of the window, but the female fly never made a mistake; the eggs were always deposited upon the meat and never upon the fat. Moreover, I tried to raise the young larvæ upon fat. As was to be expected with this kind of food they did not grow and soon died. It was possible to find out in these young larvæ the mechanics of this peculiar instinct of their mothers. The larvæ are oriented by certain chemical substances which emanate from a centre, and this orientation takes place in the same way as the orientation of the larvæ of Porthesia by the light. The rôle which the ray of light plays in the heliotropic experiments is played in these experiments by the lines along which

the molecules are carried away from the centre of diffusion into the surrounding medium. The chemical effects of these molecules upon certain elements of the skin influence the tension of the muscles in somewhat the same way as the rays of light do in heliotropic animals. We call the orientation of an organism through diffusing molecules, chemotropism, and speak of positive chemotropism if the animal is forced to bring its axis of symmetry into the direction of the lines of diffusion, and to turn its head towards the centre of diffusion. In this orientation again, each pair of symmetrical points of the surface of the animal is cut at the same angle by the lines of diffusion. It can easily be shown that the larvæ of the fly are positively chemotropic towards certain volatile substances, which are formed in putrefying meat and cheese, but which are not contained in fat. The substances in question therefore are volatile nitrogenous compounds. The young larvæ of the fly is guided by these substances to the centre of diffusion in the same way that the moth is guided into the flame. The female fly possesses the same positive chemotropism for these substances as the larvæ, and is therefore led to the meat. On the meat chemical stimuli seem to produce in the form of a reflex the deposition of the eggs. Neither experience nor conscious choice plays any rôle in these processes.

If we raise the question, what must be contained in the egg in order to transmit this instinct, we see that again two things are necessary. First, the presence of a substance, which either is influenced directly by the above-mentioned volatile compounds contained in putrid meat, or from which such changeable substances can originate. Secondly, conditions which lead to a bilateral symmetry of the embryo. But neither of these two conditions presupposes any mysterious structure in the egg, such as Nägeli, Weismann and others assume.

3. A third group of instincts is represented by the periodic migrations of animals. I select as an example the periodic depth migrations of sea animals. I should have preferred the more popular instance of bird migrations, if it were not for the fact that we can experimentally analyse the migrations of sea animals, whereas the migrations of birds have not yet been, and cannot very well be,

submitted to experimental research. A number of sea animals begin to migrate upwards towards the surface of the ocean in the evening, while in the morning they begin to migrate downwards. But the remarkable circumstance is, that these forms never go deeper than four hundred metres. The latter circumstance points out the light as the moving force in these depth migrations. Water absorbs light and the thicker the layer of water the more light is absorbed. It has been found that at the depth of four hundred metres a photographic plate is no longer affected. The animals which live free at the surface of the ocean, as far as I have been able to examine them, are all positively heliotropic. Those among them which undergo daily the above mentioned periodic migration into the depth, possess some peculiarities which can only be understood if we go a little deeper into the theory of animal heliotropism.

In addition to animals that are positively heliotropic, there are others that are negatively heliotropic: they bring their median plane also into the direction of the rays of light, but turn their *aboral* poles to the source of light. The difference between negatively and positively heliotropic animals is determined by the following circumstance: If the light falls upon one side of a positively heliotropic animal, an *increase* takes place in the tension of those muscles which turn the head of the animal towards the source of light, while in negatively heliotropic animals under the influence of one-sided illumination a *decrease* of the tension of the same muscles takes place. The consequence is that these negatively heliotropic animals are forced to move in a straight line away from the source of light, while the positively heliotropic animals are forced to move towards the source of light. Groom and I have examined the heliotropism of the larva of a Crustacean *Balanus perforatus* of which it was known that it undergoes such a periodic depth migration. One of the results of our experiments was that these larvæ are sometimes negatively and sometimes positively heliotropic and we succeeded in making them positively or negatively heliotropic at desire. In weak light, especially in gas light which contains relatively few blue rays, they became and remained positively heliotropic; while, in strong light, they invariably became very soon

negatively heliotropic. This determines the depth migrations of these animals. If in the morning they are near the surface of the ocean, the strong light makes them negatively heliotropic, and forces them vertically downwards, as only the vertical component of the reflected light of the sky can orient these animals in the open sea. But as soon as they approach a depth of four hundred metres the light becomes so weak, that they now become positively heliotropic. They, therefore, must begin to migrate upwards again, but they cannot penetrate to the surface, as during the daytime they very soon reach a region of strong light, where they become negatively heliotropic. Thus they are kept suspended during the day time at a certain depth, which, however, is less than four hundred metres. But as soon as it grows darker and the intensity of the light in the water begins to decrease more and more, they must on account of their positive heliotropism, ascend into constantly higher regions; until during the night, when the intensity of the light is weak, they are held at the surface of the sea. In the morning they again become negatively heliotropic, starting their downward career over again.

But there is also another depth migration of a larger period, which corresponds more to the migration of the birds. In the Bay of Naples, as Chun has found, certain animals remain during summer, even during the night, at a greater depth without ever coming to the surface. This is probably caused by the higher temperature which makes certain animals, even in weak light, negatively heliotropic, while the same animals, at a lower temperature, remain positively heliotropic, even in the strongest light. I found these reactions among others in larvæ of *Polygordius*.

We therefore see that the instinct of migration, as far as it appears in the periodic depth-migrations of marine animals, can be explained by the presence of a substance which is sensitive toward light but which undergoes certain modifications with the change of light or temperature; and we can easily understand that a simple cell like the egg can be the carrier of this substance or some other substance from which it originates.

4. A number of animals show habits which we might, perhaps,

call protective instincts. Such animals hide in crevices or burrow. Thus they escape their enemies. For the heredity of this instinct equally simple circumstances suffice as for the heredity of the instincts characterised above. I have found that animals which force themselves into crevices do not do this in order to escape their enemies, but that these animals are forced to bring their bodies in contact with solid bodies. This kind of irritability is found in *Forficula*, in certain kinds of butterflies (*Amphipyra*), in larvæ of many insects and in worms. If one puts two plates of glass one above the other and so near that they are only separated by a small space, the above-mentioned animals force themselves between the two plates. They even do that when the plates are exposed to the full sunlight, in which case they are, of course, not protected from their enemies. They do it, moreover, when one-half of the box in which they are is quite dark, but does not offer them any such contact-stimuli as the two plates of glass.

This apparent protective instinct is a tropism of a similar kind as heliotropism, with this difference only that contact instead of light forms the cause of orientation. I called this class of phenomena orientation stereotropism, and could show that there is positive and negative stereotropism. In a hydroid, Tubularia, the polyp is negatively stereotropic, that is to say, it bends away from a solid body with which it comes in contact, while the root is positively stereotropic.

This peculiar form of irritability appears to play a rôle in a process which is frequently quoted, viz., the founding of a new nest by ants. At the time of sexual maturity, the males and females of ants become very energetically positively heliotropic, and this heliotropism may possibly direct them in their wedding flight. They leave their nests and follow the direction of the rays of light in a swarm. Procreation takes place in the air. As soon as it becomes darker, stereotropism overcomes the influence of light, the animals fall down and creep into crevices where they are held by their positive stereotropism and where they now deposit their eggs.

How contact-stimuli can affect life-phenomena is less easily explained than in the case of light. Possibly the pressure or fric-

tion against solid bodies influences the chemical processes in the cells. It is possible, too, that capillary effects may play a rôle. In any case, purely metabolic conditions are sufficient to explain these instincts and to do away with mystical ideas concerning their transmission through the egg.

II.

Through the above-mentioned facts we have been led to the view that, as far as the instincts are concerned, there is no reason to suppose that the egg contains other mysterious complicated structures than such as might possibly be expressed in the formulæ of the chemist. As soon as we decompose the complicated instincts into their elements, we understand that a simple cell like the egg can be the bearer of complicated instincts. The conditions in the egg which are required for this purpose are, to emphasise it once more, (1) polar differences in the chemical constitution in the egg substance, and (2) the presence of such substances in the egg as determine heliotropic, chemotropic, stereotropic, and similar phenomena of irritability.

But the egg is the bearer of another series of hereditary qualities, viz., of the animal's bodily system. Again we must raise the question how such a simple thing as the egg can be the carrier of circumstances which determine so complicated structures as are those of most animals. Again we have, *a priori*, the choice between two answers. Either the simplicity of the egg-structure is only an illusion, and we have in reality an invisible structure of the same degree of complexity in the egg as that of the adult organism; or, secondly, we do not require the mysterious structures for the transmission of such complicated mechanisms as seem to be necessary for the formation of organs, and comparatively simple conditions of the cellular substance in connexion with external circumstances are sufficient to explain the mystery.

It is well known that the egg of a sea-urchin is at first a single spherical cell which after fertilisation breaks up into many correspondingly smaller cells, from which aggregation of small cells a hollow sphere originates filled with liquid, the so-called blastula.

The wall of this hollow sphere is formed by the small cells of the egg. At this stage of development the larvæ are already able to swim around. A little later an increased growth takes place at one place of this hollow sphere, and the consequence is that this rapidly growing part is pushed into the interior of the hollow sphere. Thus the next embryonic phase is reached, the so-called gastrula stage. Finally in certain places of the gastrula, crystals of calcium salts are formed, and the skeleton originates, with the formation of which the embryo enters the so-called pluteus stage.

What must be contained in the egg in order to cause this succession of larval stages which finally lead to the adult form of the sea urchin? If we analyse the conditions which lead to the origin of these successive stages, we see that circumstances of no less simplicity are sufficient as for the heredity of instincts. The blastula is determined through two circumstances: (1) through the fact that the spherical egg is surrounded by sea water, and (2) that the osmotic and metabolic qualities of the protoplasm of the egg are of such a nature that liquid is pressed from the water into the interior of the sphere. In addition, capillary forces between the cells probably play a rôle, too, in the arrangement of the wall of the blastula. Thus the cavity of the blastula is formed. Therefore the egg does not need any other qualities for the heredity of the blastula stage, than certain chemical substances and the osmotic properties which are peculiar to almost all living protoplasms, and which we can imitate in the laboratory in artificial membranes.

The formation of the gastrula from the blastula presupposes that two different substances are present in the egg, which form the ectoderm and the entoderm. These may be separated from the beginning, and this would harmonise with the assumption which we have made in regard to the instincts, viz., that the different poles of the animal are already intimated in the unicellular egg by a corresponding distribution of the different substances. But it is not even absolutely necessary that this separation exists already in the original egg-cell. It is quite possible that migrations of substances take place in the blastula through osmosis, which lead to a gathering of specific entodermal substances at a certain place in the blas-

tula. Here the entoderm is formed and invagination into the cavity of the blastula takes place.

The formation of a skeleton is nothing but the precipitation of crystals of certain salts of calcium. The conditions for this are purely physical, and without doubt are determined through metabolism and osmotic processes. Through their action such an increase in the concentration of the intracellular or pericellular liquids is produced in certain places that these crystals must be formed. Thus again, as in the case of instinct, the analysis of the phenomena renders the assumption of mysteriously complicated structures in the egg unnecessary.

That this idea is correct can be proven by the following experiment: If one brings newly fertilised eggs of a Sea Urchin (*Arbacia*) into sea water which has been diluted by the addition of one hundred per cent. fresh water, the contents of the egg take up so much water that the membrane of the egg bursts. Part of the protoplasm flows out from the egg without becoming entirely separated from the protoplasm which remains in the egg. Both droplets of protoplasm outside as well as inside the egg assume a spherical shape. Thus the egg which normally has the shape of a sphere assumes the shape of a dumb-bell. If these dumb-bell shaped eggs are brought back into normal sea water they develop. Very often, in fact in most cases, each of the two spheres of the dumb-bell will form a special blastula, so that such an egg gives rise to twins. The rest of the eggs form a single blastula which in the beginning is dumb-bell shaped but which later on becomes spherical. The later development of the twins as well as of the single Blastula is in general a normal one. This result of the experiments corresponds with our proposition that the blastula is determined by the osmotic entering of liquids into the interior of the segmented egg. If the egg is dumb-bell shaped a secretion must take place into the centre of both spheres of the dumb-bell. If, in this case, the substance which connects the two spheres is not torn we get two blastulæ and consequently twins. But if the hydrostatic pressure inside of the spheres or any other conditions bring about a communication between the liquid contents of the two hollow spheres, then

only one blastula and only one embryo is formed. If the egg contained a mysterious structure which pre-determines the future embryo, we should expect that *one distorted* larva would originate from the egg transformed into a double sphere, and not two or one perfect larvæ, as is generally the case.

Still another field of phenomena makes it impossible to attempt to lead back the hereditary forms to mysterious egg-structures of a highly complicated nature. I mean the phenomena of heteromorphosis. By heteromorphosis we mean the substitution of an organ by another one which is different morphologically and physiologically. Tubularia, a hydroid, consists of a stem which carries on one end, a polyp or head and on the other end a root or foot. If one cuts off the foot and surrounds the wound with sea water from all sides, a new head is formed instead of a foot. We thus have an animal which has a head on each end of its body. But if we bring the wound in contact with a solid body, such as the bottom of the aquarium, a foot is formed. If we cut a piece out of the stem, which is only of the size of a polyp and surround it by water from all sides, a head is formed at either end, but as there is no material left between the two heads, we thus obtain Janus heads, without stem and foot.

These two kinds of experiments may suffice to intimate that as soon as we begin to analyse the process of morphogenesis, we find it unnecessary and even faulty to assume a complicated structure in the egg in order to explain the continuity of forms.

Finally, I should like to emphasise one circumstance which repeats itself in the history of science and especially biology. Whenever we are not able to explain complicated phenomena, we are at first inclined to imagine that their cause must be of similar complication to the phenomenon itself. Thus the idea of an invisible complicated egg-structure was adopted in order to explain the heredity of instincts and forms, and thus the ideas of mysterious structures of the ganglionic cells are still held by many in order to explain the mechanism of reflex phenomena and instinct. All these attempts fail for the reason that they try to explain complicated phenomena without having them analysed into their simpler con-

stituents. As long as we consider instincts as units which cannot be decomposed, we must naturally imagine the heredity of these instincts under the mental picture of a mysterious clock-work contained in the egg. But as soon as we analyse them, we are confronted with very simple phenomena which make the idea of a mysterious invisible structure as the cause of these instincts unnecessary.

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THE VALUE OF PAIN.

PAIN is one of the essential conditions of progress. Not merely in the sense of being part of the friction which necessarily accompanies all movement, but as a vital precedent of all possibility of movement. Ask any biologist what is the first and most important property of living matter and he will tell you that it is "irritability," the power of responding to stimuli or impressions. Touch with a needle point the most beautiful and brilliant crystal and you get absolutely no response, turn to the grayest and flabbiest bit of ditch-water animal-jelly that you can find and he moves himself away from the steel at once.

He can feel, therefore he lives. And if he feels at all he must be able to feel pain as well as pleasure. Nay it is even more important that he should perceive the disagreeable stimulus than the agreeable, for the former needs to be moved away from while the latter does not. Leave him capable of only pleasurable sensations and he will be destroyed inside of an hour.

In this earliest form the powers of sensation and of responding to impressions are combined in the same cell, but as the organism becomes more complex, more extensive and powerful movements are called for, and special cells are set aside for contractile purposes alone, leaving to the surface cells the duty of sensation only. Later it becomes not merely a question of escape but also of retaliation, and a central office to combine the muscle-strands in orderly military movements is needed and the ganglion-brain is called into being. In the meantime the surface cells have been dividing up the work of feeling among themselves, some have educated themselves to catch the finest variations in the light-rays

some confine their entire study to the sound-waves, others to the changes of temperature, while the vast majority of them simply refine upon their original powers of contact-perception or touch. Thus out of the simple possibility of discomfort arise the five senses, their muscle-standing-army and their joint judicio-executive brain. Pain is the mother of the mind, and muscle is its father.

Nor can this powerful factor in the creation of the body-organism be permitted to "rest upon the seventh day," like the Jahveh of Genesis, when its work is apparently completed. The possibility of the continuance of life absolutely depends upon its incessant activity. Cut the nerve which connects any part or organ with the conscious brain and you place it in serious peril at once. Precisely as if you blindfolded a man and then turned him loose in an enemy's country, or as if you cut the wire which connected an outlying military post with headquarters. You may cut the motor nerve which conveys orders from the brain, or, what is equivalent, destroy the "motor centre" of the part in the brain with comparative impunity, as far as the nutrition of the limb is concerned; it loses the power of motion, but even the muscles retain their bulk for a long time in spite of lack of exercise and the general health if the member remains perfect.

But it is far otherwise when sensation is destroyed. The benumbed hand or foot goes stumbling along like a blind man, cutting itself here, burning itself there, rasping its surface against a hundred objects, and from every merest scratch an ulcer forms. So long as all its cells are in health and vigor and can live on the standard rations of the rest of the body, issued to them through the blood-vessels, all goes well, but the moment any of them fall below par from injury or otherwise and cannot notify the central commissariat of the fact, they fall into the plight of a baby trying to live on government rations of hard-tack and salt-beef. That heat and swelling about a wound which we term "inflammation" is merely a forced and special feeding-up of the neighboring cells to enable them to breed rapidly and fill the gap, and while in excess it is a source of danger in itself, in its absence there can be no healing.

Observe it is not the loss of the power to pass the signal "All's well" that is injurious, it is the inability to report discomfort. Not the absence of all sensation, but the absence of painful ones that is fatal.

For instance, in paralysis of the aged, one of the chief dangers to life is from the formation of ulcers about the back and hips due solely to pressure against the mattress and hence known as "bed-sores." The peculiar danger of these is first that, sensation being abolished, they will form without the patient's knowledge, and in neglected cases will often attain the size of the palm of the hand and a depth of an inch or more before they are discovered, and second, that communication with the brain being cut off, little or no inflammation occurs and they are extremely difficult to heal. It is no uncommon thing to see them six inches in diameter and an inch deep and yet with scarcely enough inflammatory reaction around them to redden the skin at their edges. This absence of pain and consequent inflammation not only impairs healing-power but also deprives the general system of one of its chief barriers against the absorption of the products of decay, and a fatal blood-poisoning is extremely apt to occur.

A peculiar illustration of the uses of pain is afforded by that dread disease leprosy. Here one of the earliest symptoms is the loss of sensation in a hand and arm or foot while the muscular power is unaffected. Many a victim has first discovered his condition by severely burning or cutting himself without feeling pain. In one dramatically tragic case, a planter who supposed himself in perfect health thoughtlessly caught a heated lamp-chimney which was falling, and didn't know it was burning him until the smell of his scorching fingers attracted his attention! What is the result? In a very short time tiny cracks, bruises, and scratches develop all over the hand or limb affected, these rapidly grow into ulcers and either heal very slowly or steadily deepen until fingers, toes, nay even hands and feet are completely amputated by them, or the limb is so drawn and crippled by the great scars that it becomes almost useless. There are of course active processes of destruction at work as well in the disease, but the greater part of the terrible

deformities of the limbs produced by leprosy are due solely to this negative destruction of sensation and its consequences. In modern hospitals it is found that by keeping lepers in bed, in comfortable wards and protecting their extremities against injury and irritation in every possible way, their lives may be very greatly, if not almost indefinitely, prolonged.

But there is also another way in which pain is of marked benefit in case of disease or injury, and that is by securing rest for the part affected. The agony of an inflamed joint, for instance, is an imperative order to the muscles controlling its movements to keep it perfectly still and motionless. And the order is usually strictly obeyed. So important does nature consider it that, by a curious transference, the pain of a diseased hip-joint, for instance, will be felt by the sufferer in the knee and ankle, so as to keep the whole limb at rest. This function of pain is beautifully illustrated in the lower animals. A broken leg in a dog or a deer, for instance, will be so carefully protected against the pain of movement, supported against the other limb, rested against the side of the body and swung along with such a gentle movement, with its toe just trailing on the ground, that the results are often equal to the best that we can boast with all our splints and bandages. Truly, pain is nature's splint.

A similar protective influence is exerted over the inflamed lung by the acute distress of pleurisy.

"But," says some one, "what of those diseases in which pain is the principal evil, in which no structural changes can be found in any way proportionate to the agony endured, what of neuralgia, of blinding 'sick-headache,' of sciatica? Is not the pain the disease in these cases?" By no means. It cannot be too emphatically asserted that pain always *means something*. It does not occur simply as an accident of chance, still less for the purpose of developing patience, or as a "means of grace," but as a pointed reminder that something is going wrong. Neuralgia is the cry of the nerves for more sunlight, "sick-headache" a protest against eye-strain. In themselves comparatively harmless, as danger-signals they are simply invaluable. Hence the seeming paradox, that those who

suffer most, often live the longest: the sensitiveness of their nerves absolutely compels them to halt at the very threshold of danger.

Pain is literally the price of life. And this brings us to the question: "What is pain?" abstractly considered. "What is the difference and what the relation between it and pleasure?" We are all perfectly clear in our own minds on these questions, in the concrete, from personal experience, but how shall we define our conception? On careful ultimate analysis we are driven to the somewhat unexpected conclusion that pain and pleasure are really both vibrations of one and the same chord. That the very sensitiveness which makes the one possible, necessarily makes the other also possible. That the only way to prevent painful impressions, from our environment, is to destroy the mechanism which permits the reception of pleasurable ones. In short, life without pain would necessarily be life without pleasure. The old mythic poets made a shrewd guess at this scientific truth when they described the life on Olympus as "colorless," "joyless," and sang of the "twilight of the gods." And Kipling's prophetic insight has caught the same ray, in his magnificent parable, the greatest poetic conception of the century, "The Children of the Zodiac."

More than this, the two sensations are not merely vibrations of the same chord, but varying degrees of the *same vibrations*. The difference between them is one not of kind but of degree. Almost any pleasurable sensation can be transformed into a painful one by simply increasing its intensity, and many painful ones into pleasurable merely by decreasing their intensity or changing the circumstances.

The instantaneous coolness of a piece of ice placed upon a parched tongue is delicious, but let contact be prolonged only a few seconds and the very same "coolness" becomes intense discomfort. The similar "transformation" of the warmth of a Yule log is another illustration which of course suggests itself. A flood of golden sunlight is the most pleasing sight which falls upon our retina, but throw the rays directly into the eye and a dazzling pain takes the place of the former enjoyment. A gentle friction of the body-surface is an agreeable sensation to nearly every one, but in-

crease the pressure or rapidity a little and it produces a burning pain. The sensation of "sweetness" is so keenly enjoyable that it has become in connexion with "light" a critical synonym for the highest good, and in childhood an abundance of "sweeties" or "candy" is temporary Paradise, yet how many adults are there in whom a very few spoonfuls of simple sugar will not promptly convert this delight into loathing, and how few to whom the "oversweet" taste of glycerine, chloroform, or saccharine is not positively repulsive?

In short, pain is *any* sensation raised above a certain intensity. And even the degree of this intensity varies widely with the individual and the circumstances.

On the other hand, it is well-nigh impossible to draw a line of demarcation between, for instance, the pangs of hunger and the pleasant cravings of appetite, between an intolerable itching and a pleasant tickling sensation, between the joy of longing and the bitterness of "hope deferred."

"But," asks some one, "even granting that pain is necessary, is it not merely a necessary evil, and are not its general effects purely disastrous?" Quite the contrary, the effects of pain in improving and developing both the individual and the social organism have been just as powerfully beneficent as in creating them.

It is, of course, obvious that pain or the dread of it has been the chief factor in the development of the means of escape from it, and of the myriad mechanisms in beast, in bird, and fish that subserve this end. It is no mere coincidence that the most timid creatures are also the fleetest, the trout, the deer, the hare, the swallow, for instance, while their fleetness again is the only thing that enables them to afford such rare beauty of form and coloring. The fin of the fish, the wing of the bird, the legs of the deer, owe their development in large measure to hunger and fear.

There is also a pretty direct connexion between the sensitiveness of animals and the degree of their intelligence. The indifference of the turtle to pain is largely concerned with his limited cerebral capacity, the thickness of the pig's hide is a good index of his

mental power, and the stupidity of the sloth is closely connected with the dullness of all his perceptions.

But it is when we come to consider the potency of pain in social development that its value stands out most clearly. The earliest political unit is a group formed for mutual protection against hunger, cold, and wild beasts. Danger compels men to herd together, and all the social virtues are fostered by it.

The rowels of nature's most powerful spur, hunger, are continually reddening the flanks of the primitive community. The Apostle's scathing arraignment of the Cretans, "whose god is their belly," would literally apply to every savage tribe—and many a civilised one. Hunger is one of the mainsprings of progress. At its imperative command the flint was chipped into the arrow-head, the dart, the spear. In its honor the net was woven, the hoe was made, and the soil broken. To appease its cravings the wild-bull is broken to the yoke, the forests are felled, the ditch is dug through the marsh.

On its errands the ship is launched on the perilous deep and the band sent out upon the war-path. Into its service have been impressed the winds of heaven, the steam-wreaths of the cauldron, and the glittering shafts of the lightning. It is the real Aladdin's lamp of civilisation. The ceaseless westward flow of the human stream and march of the "star of empire" has been at the behest of its Genii. Whether it be born of a barren soil and a cruel sky or of the pressure of over-population, it has played a leading part in moulding the destinies of the nations.

In the fall of every world-empire from Assyria to Rome the conquering race has invariably come from a mountainous or barren land, or from a sterner sky.

And still to-day the nations of the bleakest belt of the temperate zone, where the struggle with soil and climate is severest, the Scotch, the English, the Dutch, and the North-Germans are over-running the whole of the inhabitable globe and bid fair to far outdo Alexander by more peaceable and far more stable means.

To what is the Scotchman more deeply indebted for his world-renowned, "long-headedness," enterprise, and frugality than to his

stony soil, his barren muir-lands and his "dour" climate, to say nothing of the kilted Highlander on one side of him and the English guager on the other? Have the dogged perseverance, the quenchless love of liberty, and the sturdy honesty of the Dutchman which have written him such a brilliant record on the pages of modern history no connexion with his ceaseless struggle to beat back the cruel tooth of gray old ocean from his hearth-stone? An old historian has quaintly suggested one reason for the extraordinary exploring-enterprise of those matchless old sea-falcons, our Viking ancestors, in the statement that they were "certaine of lighting upon no moe cheerlesse place, than that whence they sette forthe."

Indeed it is almost an axiom of anthropology that the white race cannot flourish where the snow never lies. Below a certain degree of latitude it invariably degenerates. The stinging kiss of the Frost-king is absolutely necessary to the perfect development of the blood-red flower of Aryan civilisation.

In fine, hunger, cold, and poverty are veritable blessings in disguise, and even to-day prompt a large proportion of our productive activities. There is the soundest physical basis for the spiritual beatitude, "Blessed are the poor."

Are the benefits of pain limited to the purely physical, the commercial, and the military aspects of man's development? Far from it, for in the intellectual and moral realms its laurels are brighter yet. I venture to claim it as the very father of science. The earliest dawn of knowledge in the mind of our primitive ancestors was a recognition of the healthfulness or harmfulness of all objects as articles of diet. A knowledge gained by bitter experience. To this day a baby's first and chief criterion of everything about him is his mouth. Into that rosy opening is thrust impartially, just as far as it will go, everything that his chubby paws can clutch from the contents of the coal-bucket to the painted monkey on a stick. And his earliest mental concept divides the universe simply into two divisions, that which tastes nice and that which does not.

Some of you may have seen a picture by the idealist Watts

which represents our first parents seated side by side upon a sunny sea-beach. A number of empty clam, oyster, whelk, and other gaudily colored sea-shells are strewed about them, the evident remains of a primitive "clam-bake" in which the couple have just been indulging. There is a pained and regretful expression upon the countenance of the man, and he presses his hand over his distended stomach in a most expressive fashion, while his wife watches him in surprise and uneasiness. Some of the shell-fish have evidently been out of season or of a poisonous variety. The title of the picture is brief but expressive: "The Birth of Experience." And after some such fashion unquestionably did human experience and human wisdom begin. And more progress was due to the bitter episodes than the sweet, for the impression made by them was incomparably deeper. The school of experience is proverbially a "hard" one, and "sadder but wiser" has become a household word. Literally "the fear of the Lord is the beginning of wisdom." Just as most of the implements of peaceful industry were originally weapons of war, so many of our most valuable scientific discoveries and inventions have their origin in the bitter stress and makeshift of acute discomfort. For instance our entire knowledge of the structure and workings in health of this wonderful body of ours had its birth in the study of its condition in disease. Pathology is the mother of both physiology and anatomy. By a singular oversight several of our organs are still described in our text-books to-day not as they appear in health or during life but as they appear after death or in positively diseased conditions. For so many centuries our attention had been called to them only when diseased or upon the post-mortem table that we had unconsciously come to regard these as their normal appearances. The first and only thing that induced primitive man to concern himself with his interior arrangements was their causing him discomfort. This discomfort whether apparently primary as pain or fever, or secondary as hunger or frost-bite, was promptly set down as due to the activities of more or less numerous evil spirits. To cure these evils it is necessary to appease the spirits; sacrifices are made, and a ritual is born. Thus the earliest gods of the race are deified discomforts. And the Je-

hovah of Decalogue, the "angry god" of the Puritan still bears sad but distinct traces of his origin. A distinct class quickly springs up whose sole function it is to propitiate or even at times repel these troublesome influences. This caste, formed for the simple but comprehensive purpose of relieving discomfort or averting disaster, both individual and tribal, is primarily medical in the broadest sense of the term. Not only is personal healing required of it, but also state medicine, sanitary science in the widest sense. But as most of the disturbances he is confronted with are attributed to spiritual agencies, his work rapidly takes on a priestly character as well. The shaman, conjurer, rain-doctor, or voodoo is neither priest nor physician—but the common ancestor of both, as his Indian name of "medicine man" indicates to this day. And from this singular and oft times grotesque individual spring not only two out of our three "learned professions," but also, incredible as it may seem, most of our scientists as well. Thus part of the bitterness of the warfare between theologians and scientists may be accounted for on the ground that it is a family feud. To aid him in the individual part of his duties, the relief of aches, of fevers, of dysenteries, our physician-priest presses into his service the herbs, the roots, the berries of the surrounding copses, or the mineral earths of the cliffs, and from these crude beginnings botany and chemistry with their descendants biology and geology are born. To this day a number of our common plants still bear the names given them from their supposed medicinal virtues: such as "boneset," "liverwort," "sorrel" ("sore heal") "feverfew," etc. For assistance in the tribal part of his functions, the prevention of drought, the securing of plentiful crops, and assuring against defeat in battle, he naturally appeals to the only heavenly bodies visible to him, and astronomy with its daughters, physics and navigation is brought into being.

Many if not most of our best known stars and planets still bear as scientific titles the names given them when prayed to for aid, or used in the construction of horoscopes.

Even as the greedy quest of the philosopher's stone led to many an invaluable chemical discovery far more "golden" to the

race than the discovery of its object would have been, or as the wild and eager search after the fountain of youth developed continent after continent of undreamed-of richness and beauty, so the desperate shifts and vigorous efforts to escape the sharp spear of pain have won for the race a knowledge, a power, and a happiness beyond their wildest dreams.

As to the uses and value of pain in the moral realm, these have been so fully and constantly insisted upon by prophets of every creed that nothing more than the merest allusion is needed here. Indeed its importance has, if anything, been exaggerated, but even upon the soberest view of the subject it must be rated very high.

For instance it is obvious that without pain or the possibility of it there could be no true courage, no patience, no self-denial or devotion, without hardship, no endurance or fortitude, without tribulation, no faith.

It is not too much to say that without suffering no true character or virtue could be developed any more than muscle and vigor without hunger and cold; that the choicest of the saints are and ever have been "they that have come up out of great tribulation."

Pain is by no means the only or even the chief influence in moulding the destiny of man, indeed as our next contention will be, its antithesis, joy, is equally necessary and even more potent, but it is the keen and biting chisel under whose edge alone can the figure of the perfect man be hewn out of the lifeless marble.

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MAN AS A MEMBER OF SOCIETY.

PART III. OF THE SERIES SCIENCE AND FAITH.

OUR INTRODUCTION to the present chapter has been long.[1] It could hardly have been otherwise, seeing that we presented there the broad initial thesis that man is of the same nature as the other animals and subject to the same laws, and that the points wherein he differs from the nearest mammals are only matters of form and of degree.

One of the propositions which resulted from our inquiry was this: impressions engender acts, dependent or not dependent upon the will; these acts by repetition become habits, which are handed down from generation to generation, and becoming established form what are called instincts. We have followed the evolution of three of these, viz.: (1) the instinct of self-preservation,—that self, which in the invertebrates is represented by scattered egos or by egos that are predominant at certain points, and which in the vertebrates has its seat in a special organ and is centralised in a single ego of which the physiological characteristic is egoism; (2) the instinct of reproduction, differentiated in the birds and mammals into the sexual instinct and the family instinct, which latter in its turn is differenced into a maternal instinct highly consolidated and free from all impurity, into a paternal instinct feebly consolidated and complex, and into a filial instinct maintaining a mean in the matter of consolidation and purity; (3) the social instinct which

[1] See *The Monist*, Vol. VI., No. 4, Vol. VII., No. 2. Translated from Dr. Topinard's manuscript by T. J. McCormack.

has for its foundation the need of relations with one's fellow beings, or altruism—an extremely variable and complex instinct, scarcely more consolidated than the paternal instinct, yet one which has given rise to a multitude of animal societies from the primitive and negative stage known as indifferent assemblages, up to a form which already reaches a high plane in the Cynocephali and the Cercopitheci. We have seen the variations of these societies. Some are intermittent, others are permanent; some are of the family type, pivoting about a polygamous male, others are formed of families more or less amalgamated.

We have now to continue our inquiry with man. The field is quite different. With wild animals,—the only ones we were obliged to consider,—our information was as a rule insufficient. We were fortunate if we were able to reconstruct the approximate social type of the genus or the species. It was impossible for us to consider the variations according to groups, environments, and *a fortiori*, with few exceptions, according to periods. The question of the evolution of social forms throughout the course of centuries was inaccessible. With the exception, perhaps, of the bees and the ants, science can establish the sociology proper of no animal.

With man it is different. Although all the knowledge we might wish is not always forthcoming, yet generally speaking it is considerable. Man speaks and can personally give us information concerning his manners, customs, and sentiments. He has his history, his archæology, and his legends. He is spread over the whole surface of the globe and divided into an infinite number of groups, frequently having no communication with one another. In his case the problem is no longer that of describing a social type, but of describing a multitude in time and space, where it is our task to determine both the differences and resemblances. Human societies give rise thus to a human sociology proper if not to a comparative human psychology, the scope of which is broad and which involves an endless number of problems. Let us recall the position which this science occupies in the general body of human knowledge.

The second branch of anthropology is divided into two parts:

first, descriptive anthropology, or ethnography, in which the facts are gathered and classified according to two methods, by tribes or nations, and by particular subjects; secondly, speculative anthropology, or ethnology, in which are established the concatenation of the facts so reached, their causes and consequences, and the laws or general truths which flow from them.[1]

Similarly, human sociology is divided into sociography and sociology properly so-called. It occupies itself particularly with the facts gathered by ethnography, as these bear upon the family, society, and morals. It studies in man the associations between individuals free to move and to act, just as in invertebrates we study the associations between the merids or zoids that adhere together. A third part is the complement of the foregoing—social science, that is to say, the applications of sociology to the present phases of human societies, which it is incumbent upon us to correct and to perfect, or, as some say, to remodel, so as to secure the greatest happiness of all or of nearly all consistent with the greatest possible equity. The present article will deal with the first and second parts.

What was man at his origin? How were his first societies constituted, and how have they been evolved, in attaining the present phase? Such are the questions on which we shall have to dwell.

Thus considered, the history of human societies is arbitrarily divided as follows: (1) primitive societies in the true sense of the word; (2) prehistoric societies; (3) the lowest savage societies as yet discovered; (4) the more or less barbarous societies; (5) the more or less civilised societies of Central America on the one hand, of China, India, and Egypt down to Greece and Rome on the other; and (6) societies subsequent to the Christian era down to the present.

Darwin, Spencer, and some others, have sought to reconstruct the primitive man. To start with, he has been progressively formed at one or at several points of the globe at the expense of one or of

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[1] Dr. Daniel Brinton has excellently remarked: "It is the aim of ethnography (ἔθνος, people, and γράφειν, to describe) to depict, and that of ethnology to explain."

several precursors. According to the first hypothesis, he was subsequently differentiated into branches which, to judge from the morphological facts in our possession, may be reduced to five or to nine at least, viz.: (1) the blacks with woolly hair, divided into the dolichocephalic and the brachycephalic; (2) the blacks with straight[1] hair, designated by Huxley as Australoids; (3) the yellow races divided into the dolichocephalic and brachycephalic; (4) the browns or Melanochroids of Huxley, small and dolichocephalic; (5) the blonds or Xanthochroids of the same author, large and dolichocephalic. Both hypotheses are tenable, but that of the unity of the types is the most probable. All the primitive varieties of the human species may be said to have been produced by differentiation, adaptation, and crossing in the same manner as the present varieties of the domestic dog according to the palæontologists are sprung from the *Canis familiaris fossilis*. The initial progenitor is said to have been black, dolichocephalic, and prognathous.

The characters which essentially distinguish man from the anthropoids are four in number (*The Monist*, 1895, Vol. VI., pp. 33-44), two of which are physical—perfect adaptation to the vertical posture, and a greater development of the brain in volume, convolutions, and inward structure—and two of which are physiological: speech and reason.

We say reason so as to conform to usage. In reality, at the beginning it does not deserve that name. The animal species, from whose bosom primitive man has sprung, presented, like any high or low group of present men, a scale of very extensive variations. There were found here incapable individuals, absolutely refractory to new acquisitions, indifferent individuals forming the large majority, and finally, individuals evincing some endowment and talent. The latter were the most active, remembering best their sensations and their prior acts, and seeking the hardest to understand things. Some fact attracted their attention, they stopped to consider it, compared other prior facts with it, drew from their comparison

[1] The word "straight" is ill chosen but is consecrated by usage. The word "yellow" has the same fault.

some relation, some view of the whole, and acted with a more exact notion of the consequences of their acts. One of the highest faculties of certain monkeys, if not of the majority, is the eager persistency with which they scrutinise an object that has been put into their hands, and keep turning it over until they have gotten clear concerning its ways of working and its use. (Romanes, *Animal Intelligence.*) They then throw it aside and give it no more thought. Primitive man goes farther here. Where a monkey opens a nut with a pointed object, or breaks it with a stone, repeating his act with little improvement, primitive man essays to manufacture some similar pointed object or to make of the stone a hammer. Attention to things which directly concern the satisfaction of his needs, the desire to appropriate these things to this end, and the initiative which he takes, are the characteristics of his first cerebral acquisitions. The ape, his precursor, or the dull primitive man, abandons himself to his hereditary habits, that is to say, to routine. Talented primitive man modifies his conduct and profits by his experience. The making of tools or of improved means of defence against wild animals was without doubt the first step taken by man in the domain of intellect. I believe the discovery of the means of obtaining fire was not made until sometime later. Among the lowest savages we know of, we find legends relating to this discovery, but none concerning the origin of the simplest weapons.

Subsequent progress must have been slow. To judge from the lowest savages of to-day, primitive man showed little foresight. His horizon in countries where congeners were scarce was almost limited to the animals with which he struggled. His needs were mediocre. The excitations which later exercised so great an influence upon the development of his faculties were almost entirely lacking. Yet selection, despite these circumstances, was still at work. The individuals who were best equipped with the power of initiative survived and multiplied. The day came when those who knew how to put to its best use the new instrument which they possessed, the embryonic intelligence which had formed in them, came into the majority and were formally distinguished from the species which had given them birth.

The question has been raised as to which was prior, primitive language or primitive reason. Every impression or sensation tends to give rise, in the absence of attention being directed to it by the ego, to a simple or complex reflex action, in the last case anteriorly co-ordinated by habit. To this class belong the gestures and contractions of the facial muscles accompanying actions, voluntary or involuntary. Thought, by itself, awakes such reflexes. We half shut our eyes, the face expresses joy or pain, the body bends, the hands are unconsciously extended in different directions, as if to deliver the thought. From this point the step is not far to expressing emotions and desires voluntarily by gestures, and even to varying them in particular cases. Gesture language necessarily preceded every other. The physiological analysis which Ribot has given corroborates this position. The imperfectly developed gesture-language of the Australians and the very highly developed gesture-language of the Indians of North America are survivals of it. It had long to supply the needs of primitive man and to contribute to fixing and multiplying his first elementary ideas and particularly his first emotions, but sooner or later it led perforce to the word. Lacking the word, animals possess the general faculty of expressing their needs, sensations, and sentiments in various ways. These ways vary in form and number with the species. Many have three, five, or ten ways, according to what they wish to express. The majority, if not all, are simply co-ordinated reflex acts, some of which are unconscious and others of which are voluntary or alternately unconscious and voluntary. It is quite natural, therefore, that primitive man, as his gesture-language became more precise, should have made an effort to accompany it with sounds in some way connected with what he desired to express. Unconsciously at first, and then consciously, he modulated his utterances by his larynx, and then progressively articulated them with his mouth. He thus soon attained the power of calling in moments of danger, of commanding in the management of his household, or in the chase, and even of recounting during the evenings his adventures after the manner of the howling monkeys, but better.

The power of the spoken word having been once acquired, the

development of mind advanced more rapidly, hand in hand with the development of language. Although words do not engender ideas, they have upon them a powerful influence. They fix them, render possible their classification, and aid thus in the acquisition of new ideas.

In fine, primitive man did not for a long time greatly differ from the animal, be it ape or anthropoid, which was his precursor and from which he sprung. From the animal stage he drew away but slowly. What was he then, from the point of view of family and of society, during the interval between the period when he was definitively formed and the period represented by the modern savage? For the psychical characters we might consult the infant, on the principle which is true in its generality, that ontogeny is a reproduction of phylogeny; but this is not our subject. In conjecturing what were their customs, we should be guided less by present men, who are all more or less modified and perhaps falsified in their habits by circumstances, than by the animals to which primitive man bears the most resemblance.

First, how did primitive man comport himself with regard to reproduction? Did he restrict himself, as is possible, simply to combating his rivals when seeking the female of his choice, to satisfying the needs of rut, and then departing after the manner of many other mammals? Or did he prolong the union until the birth of the young, until weaning, or until after the rearing only, as it is said certain orangs do? Or, did he prolong the union until he had several offspring, that is to say, indefinitely, as some gorillas certainly do? Was he monogamous as is the Soko of Livingstone or polygamous as certain chimpanzees are said to be? As to sociability, did he live alone with his family as is sometimes the habit of the anthropoids, or in small associations of distinct families as is the case with the Soko, or in large societies, as undoubtedly the anthropoids do when they are numerous, and as do also the Cynocephali and the Cercopitheci? This we cannot say exactly.

As for ourselves, in consideration of the varied habits of the anthropoid, and in consideration of the nature of man generally, such as we know him, we think that his social and family types

were not everywhere the same and depended on habits unconsciously contracted, but that generally speaking he was rather monogamous and distributed into social groups. Do we not see him even to-day accommodate himself to all systems? Several considerations corroborate this view. On the one hand, man is even more influenced than the other mammals by the development of those elements that make for sociability and for companionship with his fellows. He has need of loving associates, he is fond of domineering and of displaying his talents, he has need of talking, of singing, of playing, of being listened to and admired. All this is as strongly developed among the lowest savages as among civilised men. Negroes love to laugh, to play the buffoon, to lift their voices: it is the small coin of altruism as of sociability.

On the other hand, man is possessed of more or less motives which impel him to egoism. He reviews his acts, their advantages, and their disadvantages. His reason causes him constantly to vacillate between two tendencies: the one of associating with his fellows for the advantage which he expects to derive therefrom, and the other of entirely dispensing with them, of eliminating their competition.

His conduct, therefore, will differ according to the circumstances. In one place, where climate, abundance of nutrition, and the absence of dangerous enemies render life easy, primitive man ought, after the manner of herbivorous animals, to be gentle and disposed to living in society. In another place where existence is difficult, the means of subsistence scarce, ferocious animals numerous, himself naked and in addition poorly armed, always upon the *qui vive* against surprises or against the possibility of letting slip good opportunities—here he is or was in the position of the general run of the Carnivora and must have lived a life of seclusion, having as his retreat and that of his family some hidden cave, like the lair of the wild animals which were his prototype.

In fine, we may conclude that primitive man was neither better nor worse than the other animals, and in particular than the apes; that he was neither more sociable nor less sociable and that he had

different habits according to the circumstances: the most widely spread tendency being monogamy and life in little bands.

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It is unnecessary to mention that no primitive type has come down to us. The six or seven so-called primordial races which we assume are only probabilities, induced from those which we have observed to-day, mixed, crossed, married and remarried, ten, twenty, or one hundred times perhaps. The races which must have approached nearest to the type in question are the prehistoric races, —but which? For lack of others, let us look at those of Europe—the only ones that are at all known.

If we accept the conclusion generally admitted in the United States regarding the end of the Glacial Epoch in the region of the Great Lakes and the approximate parallelism of glacial phenomena in America and Europe, the most ancient authentic remains of human industry in the latter country would not go back to more than 10,000 years about. That is not much. It would then be necessary to divide this space of time in Central Europe approximately as follow: the Palæolithic Epoch, 3,500 years; the Neolithic Epoch, 2,500 years; the Bronze Age, 1,800 years; the Iron Age, 300 years; the Christian Epoch, 1,900; total, 10,000.[1] We must draw the conclusion that the most ancient race of men we know of in Europe, that of the glacial alluvium of Chelles, cannot be primitive, and therefore that it took its origin elsewhere. At that moment in fact a formidable barrier of ice descended from Scandinavia not far from the Hartz Mountains and the Black Forest, and joining with the glaciers of Switzerland and Upper Italy left only narrow passageways, which greatly restricted communications with Eastern Europe; whilst on the other hand on the South communication with Africa was quite easy by way of several strips of land which have since disappeared. It has been assumed that the men of Chelles, that is to say, of the first Palæolithic Epoch, were of the Neander-

[1] I suppose it is well understood that for us the origin of man is older than ten thousand years, but that it must be searched for in other parts of the world than those alluded to in the North of the United States and in Europe.

thal race. The assumption has not been proved. The number of pieces upon which it has been based is ridiculous. I am more inclined to believe that the Palæolithic Race of Chelles was that which we find later on, small, brown, dolichocephalic, extremely orthognathous, and with microseme orbits, spread through all Southern Europe, the isles of the Mediterranean and Northern Africa, and which I have called the Troglodyte race of the Lozère, or better, the Mediterranean race. Evidently it came northward, step by step, from Africa subsequent to the Glacial Epoch, that is to say, from the country where recently in the South of Tunis enormous quantities of Chellian[1] quaternary instruments have been discovered, and where five or six thousand years before our era the scattered tribes circulated that gave rise to the Egyptians, a race of a type still far removed from what the primitive type must have been.[2]

But nothing enables us to say what were the customs of the Chellian race. Its well-fashioned weapons lead us to believe that it manufactured other utensils which have not come down to us.

In the Post-glacial Epoch, with the Reindeer or Laugerie period, the elements of valuation increase. The men of that day lived partly in families in separate caves, partly in small and large aggregations in neighboring caves, or under long shelters beneath overhanging rocks. Although hunters and fishers and without agriculture, they were sedentary, fashioned implements of bone and flint, which they decorated somewhat artistically with the figures of animals, plants, and even of men. They had ornaments and funeral rites, as M. Cartailhac assures us, and procured the articles they needed from considerable distances; at times they undoubtedly exchanged them for others, and they certainly had chiefs. At Solutré, where they lived in villages, they appear to have had reserves of horses for food. In shaping their images and in chipping their pointed flints, they evidently conversed and indulged in the ameni-

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[1] Réné Collignon. *Les ages de la pierre en Tunisie*, in *Materiaux pour l'Hist. Prim. de l'homme. 3me Sér.*, T. IV., 1887, Paris.

[2] We willingly admit that the type of Java, Neanderthal, and Spy is one of the primitive types of man—scattered over the whole habitable surface of the globe at a certain epoch but accidental in Western Europe.

ties of friendship. Nothing proves that the wound of the woman of Cro-Magnon was the result of a conjugal quarrel. In a word, they had a social organisation which they must have brought from Western Europe and which precludes our regarding them as savages of a low type. At this juncture the barrier of ice had disappeared, and new men of high stature, dolichocephalic, and probably blond, had crossed the passage. For us, the type to which the name of the race of Cro-Magnon has been given is a crossed race, the result of a mixture of the local Mediterranean race of which we have spoken above, with the tall blonds who came as conquerors.[1]

In the Neolithic Epoch which followed, the number of blonds increased; another race, the brachycephalic, was added, which came by the same route. Thereafter the population is divided into groups differing both in physical characteristics and in civilisation. In one place we have the Troglodytes of the Lozère, the most ancient race, a poor and conquered people, who had been forced to take refuge in the least accessible localities. In another, we have the blonds more or less crossed, the makers of the long megalithic monuments. The brachycephalics are scarcely ever seen to predominate at any one point, which may be accounted for by the fact that they practised cremation. One of the most pronounced of the later groups is that of the Palaffites of Switzerland, among whom we see the Polished Stone Age pass into the Bronze Age, and where agriculture and industry are considerably advanced. We shall not stop here; the knowledge we might gather can be more readily gained in connexion with the populations that come later. We may confine ourselves to stating that with the exception of the refugee groups of the small-statured race, which led a really savage life as a whole, the Neolithic Epoch bears witness to a civilisation which is considerably advanced as compared with the epoch called barbarous. Vestiges of superstitions (amulets of human bones) and even of worship (the caves of Baye, etc)., if not of religion (the cromlechs and *alignements* of Brittany) are also found.

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[1] P. Topinard, *La Caverne de Beaumes chaudes, d'après les registres de Broca.—Revue d'Anthropologie*, Paris, 1886.

Let us now pass to the lowest savages known to us, such as they are represented by the historians of antiquity, the travellers of the sixth to the thirteenth century to the time of Marco-Polo, the navigators and foreign conquerors from Christopher Columbus to the end of the eighteenth century, and particularly by the travellers of the present nineteenth century. These descriptions gradually conduct us to the highest savages and from these to civilised man.

In the second half of the eighteenth century the ethnographical movement began to make itself felt. The first work in this direction was, we believe, that of Henry Home or Lord Kames, a philosopher of the Scotch school, who published in 1773 two volumes entitled *Sketches on the History of Man.*[1] The first society was that "for the observation of man," at Paris in 1799. The first "instructions to travellers" were those which were published by that Society in 1800.[2] But little progress was visible until the foundation of two other societies now well known, the Ethnological Society of Paris in 1839, by W. Edwards, and the Ethnological Society of London in 1840, by Prichard. The decisive moment, however, came in 1888 when Messrs. Tylor and Galton applied to the analysis of the manners and customs of peoples the statistical method employed in physical anthropology. To-day ethnology is one of the most popular sciences. England and the United States hold the first place in it by the number and the value of the contributions which they have furnished.

The published works are of four kinds: original matter consisting of descriptions of travellers and their classified replies to the "instructions"; monographs upon some single people or tribe; monographs upon innumerable special subjects, such as marriage, property, polity, beliefs, and folklore; and finally works which aim at synthetical views of the field in its entirety. But as is frequently the case with young sciences, inquirers have not been overcautious premature theories have been promulgated and systems produced

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[1] P. Topinard, *Eléments d'anthropologie générale.* Paris, 1885. Vigot frères.

[2] *Revue d'Anthropologie.* Année 1883, p. 132.

which were based upon insufficiently established facts, and which have had to be withdrawn. Still, the light is gradually spreading, and I believe I am not too presumptuous in attempting to sum up now in a general way the results of my reading and researches on the subject of this paper.

The great difficulty concerns the palpable beginnings of the evolution of societies. Here inquirers have been carried away by preconceived ideas or insufficient facts. The ethnographical material relative to the higher savages and barbarians is very extensive, but is absolutely meagre with regard to savages very low in the scale.

When we consult the narratives of travellers we find contradictions. One person who has first seen a given group, sees it in one light; another, coming later, sees it in a different light. A third sojourns a long time with the group in question, examines it more minutely, and, being less hampered by European preconceptions, his description destroys a part of what his predecessors have said. The traveller who travels fast always claims to have seen extraordinary things. He describes savages in the lowest imaginable stage which he knows of only by hearsay.[1] We might almost formulate this proposition: there are no very low savages, except such as we have not had the means of carefully studying. The truth is that there are no existing savages justifying the denomina-

[1] The following is an example. A certain author indicates as the lowest type of savages which one can imagine, the Guaharibos of the sources of the Orinoco, and gives an astonishing description of them, referring in a note to the Geographical Congress at Havre in 1887. Naturally I ran to the original, but found nothing. I finally discovered elsewhere that at this Congress a lecture had been held by M. Chaffanjon, who had visited the sources. In short, I found a book in which this traveller had given an account of his expedition. It turned out that he had never met one of these indigenous savages; that he had once stumbled upon a camp of seven huts that they had just abandoned; that he had seen a bridge built by them, and that he had derived all his information regarding the indigenous people in question from another tribe who had accompanied him, but who also knew of the other people only from hearsay. In short, putting all together, I found no ground which justified in the least the detailed description which had originally so startled me. I supposed that it had been taken from reporters who had listened to the lecture. See I. Chaffanjon, *L'Orénoque et le Caura*, Paris, Hachette, 1889, and Letourneau, *L'Evolution politique*, Paris, Lecrosnier, 1890.

tion of *primitive* so frequently and wrongly used. We have assumed that the oldest Europeans go back ten thousand years, but in other countries man goes back much further. The antiquity of man is certainly to be doubled or tripled, if not more. Think only of all that must have happened in Africa prior to the tribal precursors of the Egyptians; or in India, among the blacks of the jungle, before the Dravidians, whom the Aryans came upon, had made their appearance. The physical type of the Neanderthal, and even of the Java man, is almost as far removed from the probable primitive type in cranial capacity as some normal Europeans of our days are from that primitive type.

The lowest known savages, those that we can make use of, are only the remains of peoples which have had their history and which at a given moment have been driven back into places not sought by others or possessing natural defences. They are degenerate and retrogressive groups from lack of stimulus. Taking the cases singly, the proof can be established. For the Esquimaux the evidence is complete. A tribe, a people, or a whole race, may become immobilised at a certain stage for a long time. China is an extremely remarkable example of this in four or five points of view. Most of the negroes in Africa are another. A tribe, a people, may even fall behind and be at the point of extinction, when suddenly it will assume new life and energy. Ethnography and history offer numerous examples of this, but in the very lowest stages prolonged retardation is difficult; a certain minimum is necessary for subsisting in given conditions. The group dies away as is the case with all the very low, and even with the ordinary savages we know of. They are powerless to recover their lost vantage-ground, and no case of their having done so is yet known. Happily for us, the degenerate groups stand us in excellent stead for reconstructing the probable course of evolution of the first men, for retrogression is by privilege of inestimable value, being a retracing of the steps through which progression has passed.

We shall cite the groups concerning which we have the best information, and which can best guide us in our inquiry.

First we have the Veddahs, who inhabit the cliffs of Ceylon,

and whom we should not confound with those of the coasts and villages, who have been more or less changed by contact with the Singhalese. According to a Greek author of the fifth century, they occupied the forests they now inhabit, for 1500 or 2000 years. According to the census of 1881 there were only 200 of them still alive.

Secondly, there are the Bushmen of the desert of Kalahari who are one of the southerly scattered fragments of a race formerly spread over a good part of Central Africa of which the Obongos of Du Chaillu, the Akkas of Schweinfurth, the Wambuty of Stanley, are other fragments. The Obongos are a stage higher in type than the Bushmen and the Akkas several stages higher still. The poisoned arrows of the Wambuty and several details which we have from Sporck who has recently visited them lead us to believe that they are not so low as Stanley thought.

Thirdly, we have the Fuegian Yahgans of Tierra del Fuego, who must be distinguished from the Fuegian Onas and Alcaloufs, who are more nearly related to the Patagonians. They were evidently driven back at some unknown period into the benighted region which they now occupy.

Fourthly, we have the Andamans who have inhabited the islands of the Bay of Bengal from the year 851 of our era at least, and whom anthropology regards as the most typical representatives of the Negrito race of which other fragments are found here and there in the Malay Archipelago.

It is difficult to establish the exact rank of these four groups. In certain traits they are lower, in others they are higher. The Veddahs seem to come nearest the primitive state.

Next come the Tasmanians, a race which has recently become extinct and which we can only appraise by information which dates anteriorly to the time when the English began to exterminate them.

Then we have the Australians, which have long been placed at the lowest stage but which are now ranked several degrees higher. But here and there in the ancient reports we have accounts of iso-

lated groups which poor conditions of existence had rendered inferior.[1]

There are also the Esquimaux who formerly extended far South to the boundaries of the United States on the one hand and into Asia on the other, whom warlike tribes drove back into arctic regions and who to-day are disappearing.

We shall merely refer to the few extremely savage and not well known groups of the interior of the isles of Northern Melanesia, of the Sunda Archipelago, of the Philippine Islands, and of the Peninsula of Malacca. In the Deccan, the Ghats, and the Nilgiris, we have found nothing that can serve us. I must say the same for Siberia. In America the lowest savages after the Fuegians are probably the Botocudos of Brazil and certain tribes of Yumas of Lower California. In Africa nothing is to be added to the Bushmen.

It goes without saying that with the space at our command we can make no citations, nor refer to our authorities. We shall give nothing but a simple picture, dwelling only upon the points which we desire to place in relief.

The lowest savages differ in character, disposition, and manners according to the more or less difficult conditions of existence in which they are found, and according as they have more or less connexion with other men, savages or Europeans, who stimulate or falsify their character. In himself, the savage is usually gentle, kind, of an easy disposition, and with a tendency to jollity. He is honest, does not lie, and attempts to do no harm either to his own people or to strangers. He is sensible to kindnesses which have been extended to him, well wishing, and endowed with a goodly portion of altruism. Distrustful, like animals who see for the first time a creature which they do not know, his second impulse is that of gentleness. Nevertheless, he is quick and violent in responding to impressions and may abandon himself to regrettable acts, but he quickly regains his natural tendency and grants pardon when the offence has not been too grave. Before marriage the girls

[1] P. Topinard. *Instructions sur les indigènes de l'Australie*, Paris, 1872.

and boys come early under the sway of the sexual instinct, and yield to it neither more nor less than in our civilised countries. The savage woman is chaste and modest, although nude. Her parents carefully watch her; she will have one lover or several, or she will be debauched; if in the first case she has a child, public opinion requires that the youth should marry her and take charge of the offspring. After marriage the couple are faithful in the same degree that they are in our modern societies, if not more so. The husband always keeps the same woman. The instance which Darwin cites without mentioning the source is typical. "The cliff Veddahs are monogamous until death," said Bailey to a polygamous Singhalese. "Yes," responded the latter, with a contemptuous smile, "like the Wanderoo." The ape to which allusion was here made, is a semnopithecus of Ceylon. Bailey was a missionary who had lived twenty years with the Veddahs and has described them in the *Transactions of the Ethnological Society of London* for 1862.

The husband repudiates his wife only exceptionally. In case of adultery he punishes her or strikes her, and no one interferes. Marriage takes place without any formality. The young man asks for the consent of the father, and sometimes makes him some small present; the girl is not consulted. Sometimes marriage is not definitive until after conception or the birth of a child. The very low savages are generally monogamous (Veddahs, Bushmen, Andamans, Esquimaux, and the Negritos of the Philippine Islands). But if he feels himself capable of supporting several wives, either from vanity or from finding his interest therein, he becomes polygamous, his first wife in that case retaining the supervision of the household. The monogamous father loves his wife; she is his companion in this social phase, and not his slave. She shares his labors. He hunts, manufactures arms, canoes, and does the heavy work; she has charge of the household and the children, gathers wood, fetches water, and carries the burdens during expeditions, particularly the burning brand which preserves the fire, whilst the husband remains free, ready to take advantage of every occasion the chase offers. When the children are old enough, the boys accompany their father on the chase and learn from him the ways of

gaining their subsistence, whilst the girls aid their mother in the care of the household. The polygamous household is less exemplary, even when the husband is more particularly devoted to one of his wives. His wives rather resemble servants, and the children are less kindly treated. The paternal affection, as in the lion which we have described, does not exist at birth. At this moment the father frequently commits, without the least tinge of emotion, acts of infanticide, either as an economical measure, or because the child is weak or malformed. But when the child has once been accepted, he readily yields to its smiles, caresses it, plays with it, loves it, and carefully discharges all his duties. As to the maternal instinct, it is upon the whole as strongly developed as in the animals, and if at times the mother assists with dry eyes in the execution of her child, the case is rare. Were there not even among the animals examples of unnatural instincts of this character?

The family state is without the least doubt the first pseudo-social phase of man. Families are independent. Each seeks in its own behalf to satisfy the needs of common existence. They are nomads in the good seasons, changing their localities according to their needs in search for food. They sleep and sojourn for longer or shorter periods of time in the places they happen to come into, be it in the hollows of rocks, as did the cynocephali of our last article, or in cavities which they dig, or in huts which they construct from branches. When they meet neighboring families they chat and play together for several days, if their stock of provisions permit it, then they leave each other, each going his own way in search of food. In the bad season they seek slightly better quarters in caves which they know, the different families being installed near each other, provided the conditions of the habitation permit it, yet still having separate and independent lodges.

But the families grow. The boys having reached the age of puberty are solicited by new sensations and roaming about more or less in the surrounding territory they meet the daughters of other families. It is the free love of the young. But some day the youths feel the desire to have a family for themselves. They get married as we have described above, and sometimes proceed to found a

new family, or sometimes remain with their wife and children with their old family, which is thus increased. The families which above accidentally met and stopped to enjoy life together for a while, were likely allies by blood. Sooner or later these intermittent associations become more frequent and prolonged. The company of one is sought more and more by the others, and individual bonds of friendship are established. Circumstances present themselves where they are directly in need of one another's services, either for a general battle or for attacking some large animal. The social habit is thus created in the same way as we have seen it rise among the birds and the mammals. And from this results the primitive or family clan, by two processes: (1) by the direct growth of the family, the children, brothers, and sisters continuing to centre about the oldest father, who naturally becomes the chief; (2) by the spontaneous association of different families living isolated in small groups and forming gradually a general coherent group of relationships of all degrees, even very remote. This is the first phase of social evolution, the family clan.

We have seen that among the animals personal property, family property, and communal property exist. The individual is here master of his prey, of his cave, of his female, and of his young. Some couples establish themselves on the shores of a lake in some rocky or grassy nook and defend its approaches against their fellows. Some bands appropriate a part of a forest or swamp land, or take possession of an entire country, and forbid other bands, like the Cynocephali from entering it. Among the very low savages, personal property always exists. Each is the owner of his own prey, subject to the restriction of dividing it upon his return and in the expectation that on the morrow his fellow-hunters will divide their share with him. He is the owner of the beehives which he has discovered and which he marks (a mark always respected), of the weapons which he has manufactured, and of the wife whom he has taken under his care. There is no question of family property at first; there is room for all, and the chosen camp whither they return for the bad season is respected just as is the territory where each family is wont to hunt, all by a sort of tacit agreement without the

interchange of a word. When families unconsciously joined in clans, the merging of property-rights must have been spontaneously effected. The family property of cave or hut was confirmed, the territories of chase became the general property of the clan; agriculture not yet existing, there was no necessity of reserving much ground about each habitation. In sum, it was an ideal life, as Rousseau surmised. If it be admitted that such was the life of the primitive family clan, in nature essentially patriarchal, the question arises, How long did it last? Undoubtedly very long. As long as men were few in number, the means of subsistence easy, and the passions of the members restricted to the clan itself.

But a day came when the population waxed great, when the members of a neighboring clan encroached upon territorial property consecrated by time, when the young men impelled by the attraction of novelty carried away by persuasion or force the women of another clan, when accidents, quarrels, and deaths resulted, when the neighboring clan assumed the right of appropriating a more favored country, etc. Then hostilities broke out, reprisals became rife, and a transitory or permanent state of war succeeded, tacit or declared. At the start, when the allied families who formed the clan were still scattered about in small groups, each defending itself after its own fashion, and without preconcerted plans, the father commanded his children and connexions. By force of circumstances, and from having been brought more closely together, some one gave utterance to some advice, showed himself more capable and more brave, and spontaneously assumed the direction of operations. Necessarily he thenceforward preserved some influence in the clan. Later when an attack was repeated and the families were more coherent, some *head-man* was named. The danger past, his powers ceased, but his influence persisted. They selected him as a judge when difficulties and quarrels were to be composed, but without granting to him the right of punishing, which was left to the council of the fathers or elders. Subsequently the nominated chief came into possession of the whole authority, which he partly shared with the council, and with one of those personages who rise so

promptly in primitive human societies, the medicine-man or sorcerer.

The first effect of such hostilities was the tightening of the communal bonds and the awakening of the sentiments of solidarity and of general interest. Each came to understand that it was above all necessary to defend the territory from which he drew his subsistence, that the cause of each was the cause of all. In the homes, nothing was changed. The fathers remained masters of their families, each responsible for the conduct of his own, punishing them at will without heed of others. But towards strangers special customs were formed. Latent evil dispositions were roused, perfidy, theft, bloodshed arose. To do harm to an enemy was an act of merit, a claim to glory. The ambition of the young entering the life of the adult is to become distinguished in this direction, to show to those whom they wish to attract that they are strong and perfectly able to defend themselves. Thenceforth the family clan becomes a political clan. It is concentrated and organised with a view to preserving its integrity as opposed to strangers. This is the first stage of the second phase of social evolution. To become complete it must be organised within, which is the second stage.

The immediate effect, we have said, of having to defend oneself is the strengthening of the bonds of the clan; the second is to alter its customs. The evil dispositions which war awakened, the resulting reprisals and accustomedness to shedding blood has transformed the character of man, who is now no longer the gentle, simple being of the ancient days, accommodating himself to all things and content with his lot, but has grown less patient and more impulsive in the evil sense. His horizon has been enlarged, he thinks more, his character is less frank, he is more active and more turbulent. The inevitable quarrels between the members of the different families grow more frequent, and compel the fathers of the families to interfere. Women are at first the most common cause of dissensions. The senses are not guided by reason, the youth and even the young married men covet the wife or daughter of their neighbor; yet though there is still no civil constitution among savages, marriage is none the less a contract, the woman is the

property of the man, and he will suffer no one to touch her without his consent.

On the other hand the clan is increased, either by the multiplication of the various branches of the initial family or by the admission of strangers or the acquisition of servants. The individuals crowd each other more and more; where there is room for few, it is uncomfortable for many; life grows annoying, each one is inconvenienced; separation and a consequent division of labor set in. Some devote themselves especially to the chase or to fishing, others to the manufacturing of arms and of canoes, others to protecting the women and children. Private property is extended to a larger number of objects, to ornaments, to household utensils, and to dwelling places, crude as these still are. They steal without constraint and even as a point of honor from the enemy; but they do not steal from their own clan—although of course there are exceptions. The natural inequalities begin to be felt: one is strong, another is weak; one is good, another is bad; one succeeds in the chase, in the manufacture of certain articles, the other does not. Character, aptitudes, intelligence, and tastes differ. Some have more influence, are more readily listened to, and possess greater privileges and distinctions. The contrasts grow, characters become more and more confirmed; emulation begins; rivalry and competition follow; in a word, struggling within the bosom of the clan sets in, with all the secret or pronounced passions which it brings in its train: suspicion, trickery, lying, jealousy, envy, and hate. Crimes and murders occur. Superstition aggravates these tendencies; some sinister accident, some disease or death is attributed to the wish or intervention of a person of the same or a neighboring clan, and opinion requires that the death so produced shall be avenged by the nearest of kin, by the family, or by the clan entire.

Then, lest quarrels should be perpetuated forever, and the inward as well as the outward security compromised, usages are established. The chief or council of elders intervenes, settles the differences, judges of the crimes, at the same time seeking to satisfy public opinion, and to forestall the repetition of like acts. Punish-

ment is created, compensation for the injury done, reparation by arms, in a word, established rules set forth the relations of the members of the clans to one another, rules which time consecrated.

The second social phase is complete. The clan is politically organised, both as opposed to foes without and as dictated by needs within. Habits have accomplished all. They have become empirically fixed under the influence of necessity, that is to say, of circumstances, and have spontaneously become rules.

The third phase of social evolution is the tribe. At times the clan increased by dividing up into secondary clans, of which the nucleus was a sub-family; at times several clans united, either from friendship or by conquest, and either preserving or losing their relative autonomy. Subsequently the tribes themselves united, thus forming federations or nations. Thenceforward the resulting concatenation of interests grows more and more complex; customs multiply in divergent senses, some dictated by conscious motives of utility, others by empiricism, many by superstition. The clans or groups come together from time to time, either for concerted action or for amusement, such as dancing and singing together—for example, the Australian *corroborees*. Ceremonies and rites are established with respect to the various stages of life, birth, puberty, marriage, and death. Rules regulating the chase, the gathering of fruits and roots are instituted. A frequent form of regulation is the taboo, that is to say, the forbidding of certain things to be done at certain times, or the eating of certain foods. Each family, clan, or tribe, has its totems, that is to say, its means of recognition, the symbols about which it rallies. Individuals have marks or insignia connecting them with the group to which they belong. They tatoo or brand themselves on different parts of their bodies.

The forms of government vary; the most frequent is the democratic form. A council formed of the fathers, elders, or the most conspicuous, exists in each fraction of the tribe, just as a general council exists for the whole tribe. At times, however, the chiefs or chief rules supreme. There are customs distinguishing each single group, and common customs connecting the general interests of

all. There is rarely pronounced agreement. The higher customs relate more frequently to religion. Punishments are most frequently fines administered in kind, and sometimes consist in corporal inflictions, slavery, or death. Property is divided into personal, family, and communal. The first, and particularly the second, have been extended; the third is the rule, but often with reservation of certain rights for the benefit of certain families and concerning especially the ground about the dwelling-place. We regret we cannot enter into details. We had intended to give here, as an example of the daily life of the first state of this phase, a *résumé* of the excellent work of Mr. Brough Smith on the Australian aborigines of Victoria, and for the advanced stage, a description of the life of the Indian of the United States in general. But we must renounce this plan as requiring too much space. The greatest number of problems which ethnology and sociology are now concerned with, bear upon this third phase. Here, from lack of written documents, inquirers are obliged to seek the connexion of manners, characters, institutions, and ideas entirely by observation, the method of survivals, and logic. We shall revert to some of these problems.

The fourth phase is that of nationalities, that is to say, of federations of tribes or groups of tribes having a central authority, or of political unifications of tribes or of peoples under the sceptre of one monarch, one oligarchy, or even a single democratic representation. The nationalities which we know of, belong to history. They appear in the New World with the empires of Peru, of Central America, and Mexico, and in the Old World with the empires of China, Babylon, Nineveh, and Egypt. They are continued by the Greek municipalities and the Roman Empire, and form a series extending, but little interrupted, to the states of modern times.

The fifth phase would be the present epoch characterised by the tendency to substitute for empiricism in the organisation of societies, the rational and scientific method.

Let us revert to some of the points of the preceding tableau. It involves, as might be expected, many variants, particularly in the third phase.

Our point of departure was man in favorable circumstances, when his character had not yet been falsified. He was kind, gentle, straightforward, disposed to altruism, resembling rather the herbivorous than the omnivorous animals. The Veddahs are typical of this state, then the Andamans. The Bushmen of the time of Levaillant, and the Fuegian Yahgans in unfavorable conditions, are already less simple and candid. I should like to stop an instant at the Esquimaux. They are situated in the worst possible circumstances, in the midst of ice, in a country without vegetation and extremely poor in alimentary resources. But having no competition the Esquimaux has remained kind, frank, and affectionate to his wife, children, and fellows. Although he formerly occupied more favored southern countries, although he occupied a certain rank in the social scale, had chiefs and tribal divisions, possessed beliefs and legends of distant migrations; although he was intelligent, ingenious, possessed of initiative, acuteness, and a pronounced taste for poetry and song, he is to-day in the lowest phase of social evolution, in the primitive patriarchal phase, without a trace of political organisation. The few traits of advanced civilisation which Mr. Franz Boas and others have described among the Esquimaux, are merely survivals. The explanation suggests itself. We have here the type of the human group of which we have spoken, a type not arrested in its evolution, but retrograded from lack of excitation. Its character affords the key. The Esquimau is apathetic, without reaction, resigned, living from day to day, and without light for half of the year. One is astonished even that he has not passed by adaptation to the state of the hibernating animal. Yet the retrogression has not necessarily affected all the characters and is due to different causes. A tribe of Indians, which Brinton cites, the Snakes, although belonging to a race which had probably raised itself to a higher plane than the ancient Esquimaux, has yet fallen back, from economical motives, to the family phase, without the slightest trace of political organisation. This is another example of retrogression reproducing the phases through which progression passed.

Let us pass to another subject. The long chapter which we devoted to the animal family and which called forth an exposition of the relations of the latter to animal society seems to demand of us a like chapter upon the human family. But numerous works have been published upon this subject, of which the latest expresses perfectly the general ideas to which we ourselves had arrived.[1] We shall consequently be brief.

The initial type of the human family, such as it appears in an analysis of our knowledge of the lowest savages and such as it certainly was with primitive man, is not a promiscuity as has been affirmed but appears just as we have above depicted it. It conforms to what the animals and particularly the apes and the anthropoids led us to expect. Writers have confounded free love outside of marriage with marriage consecrated by formal contract. The family is most commonly monogamous, sometimes polygamous, always patriarchal. The authority in the hands of the father here supplants every other form of social organisation. The father is absolute master, is responsible for all his dependents and punishes them at will. His children bear his name and inherit his property. His authority is generally mild. He voluntarily consults his daughter when he gives her in marriage, sometimes too, his wife. He is not tyrannical. If he takes to himself several wives, one is particularly favored and is his principal spouse. Later when the elder and younger branches have separated or have become subdivided, each father preserves his rights over his own, but the father of the elder acquires a higher authority over the others. Thenceforth two cases are presented. Either the family maintains its primitive form, whatever be the extent of the clan, becoming even more consolidated, as we shall soon see; or, becoming subject to the predominant influence of the clan or the new usages which that gives rise to, it enters upon a deviating course of development of the most unexpected kind.

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[1] Westermarck, *The History of Human Marriage*, London, 1891. I could not be too profuse in my commendation of this work. The bibliography with which it closes is admirably complete.

Let us begin with the first case which will oblige us to anticipate a subject which we did not wish to approach until later.

Among the sentiments which animals, for example the elephant, the dog, or the ape suddenly manifest in the presence of a new or extraordinary fact or object, are to be successively noted astonishment, curiosity, and the desire of getting clear as to its character, and, finally, when unsuccessful in this, fear and terror. Such is the case of the dog who seeing the portrait of his master on the wall, stops, looks at it, barks, then flees, returns, barks anew, and retires confounded and with lowered head. Such also is the case of the ape who, seeing his reflexion in a glass, looks around him, seeks to comprehend the situation, and at the close of his efforts runs away, casting glances of distrust behind him. It is the same with man. In the presence of the phenomena of nature and of objects which arrest his attention—the sun rising and setting each day, the lightning cleaving the clouds, the stone which has struck him—he is disturbed and restless, inquires what it means, and receiving no response makes of it, with that faculty which the dog and ape do not possess, a being endowed with life like himself, a supernatural thing. Thence he comes to regard that thing as a fetish, to convert it into a charm against bad luck, to commend himself to it, to address prayers to it. This is the first stage of human belief and sprang from fear, as Petronius has said. Like the child who strikes the object that has injured him, only going farther still, he attributes to objects intentions and an imaginary anthropomorphic power.

The second stage is that in which by mimicking further the resemblance to himself he gives to objects a spirit, a double, distinct from the object itself. This is the animism of Tylor. The savage has remarked that there are in him two beings, the one attending to the ordinary occupations of life and periodically slumbering, the other pursuing him in his dreams, and when awake forcing him often to do deeds which he cannot resist, or revealing itself in conditions which to-day we call pathological. His imagination is struck with the phenomenon and carries him still farther. Not being able to believe in natural and complete death, not being

able to believe that the friend with whom he has lived, the father who has cared for him, has totally disappeared, he supposes that his double continues to exist, that it has made a voyage or excursion in his environment and is still concerned about him. This double he sees with the same needs, the same desires, and the same exigencies as formerly. If something incomprehensible happens to him he attributes it to his double, imagines it irritated. Hence the obligations which he believes he is under to it—first, that of properly interring it with victuals, with arms, and the things which it loved most, then that of renewing these victuals and of making oblations and even sacrifices to it.

Frequently matters go no farther, the recollection of the father is effaced and *a fortiori* of the grandfather, and all those who have preceded him. But at times and that among a great number of savages these oblations are prolonged and frequently even in some of a more advanced state are confirmed and give rise to the cult of manes or ancestors which assumes considerable importance and engenders in the bosom of societies of which these families form part, powerful autonomies.

The eldest son, and, when there are several branches, the oldest in the branch, then the oldest among the survivors, has charge of the offerings and periodical ceremonies in honor of the ancestors. The spot where the latter repose becomes a sacred locality; the dwelling in which they have lived is sacred also. The enclosure where both are situated, marked off by boundaries or stones, becomes the common patrimony, which the eldest responsible son manages in the name of all and is bound to transmit intact or augmented to his descendants. An altar is erected in the habitation, where the fire, at first intermittent, is afterwards made permanent. Rites are established in which the whole family take part and from which the uninitiated are excluded. The son who is in charge of these rites is a veritable pontiff. He wields at once a patriarchal and religious authority over all the members of the family, now become a clan, not excepting the servants and the few strangers who have been admitted into its bosom after complying with certain requirements.

The bonds thus established between ascendants and descendants are mutual. The ancestors cannot dispense with the cult which is due to them. If the family becomes extinct, the common sepulchre no longer has any one to care for it and to celebrate its rites, the manes of the ancestors are cast off and condemned to wander about perpetually. It is to the interest of the latter, therefore, to protect their posterity. Thus the perpetuation of him who has charge of the rites is a paramount consideration. He is obliged to marry, to have children of the masculine sex, to divorce or to take to himself another wife if the necessity arises, to adopt a stranger as his son in the last emergency, in a word, to maintain his line of descent. There are even more extraordinary measures still adopted to stave off the consequences of sterility. In all this the woman does not count. On entering a family she is initiated into its mysteries and renounces that which she has quitted. She assists in its ceremonies, but that is all. Inheritance from one branch to another operates only through the masculine sex.

How extensively is this eminently conservative institution spread? If we examine it closely, we shall find traces of it in a great number of peoples. It existed and exists still in China where formerly the Chinese called themselves "the people of the hundred families" or clans, where the family is still organised upon that basis, under the high authority of the father, with the sanction of the domestic gods.[1] Villages are mentioned here of three thousand souls, forming but a single family. The institution also existed among the Hebrews. The clan of Abraham is a perfect example of it. It existed in India and in all branches, it seems, of the Aryan race, notably in Rome and in Greece where it has been described in a masterly manner by Fustel de Coulanges.[2]

At a distant epoch of history several of these clans or gentes became united, and without losing any of their several characters formed phratries or curiæ, which adopted as their principal common divinity the most renowned and powerful of the clan. But let us

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[1] Eugène Simon, *La Cité Chinoise*. Paris, 1885.

[2] Fustel de Coulanges, *La Cité Antique*. Thirteenth edition. Paris, 1890.

take an example from Fustel de Coulanges,—the most celebrated one. Centuries before Athens existed, Attica was occupied by upwards of a hundred independent family clans, each having its chief or pontiff, its domestic gods, one or two usually, and its "clients." Three, four, or six of these clans united and came to form twelve phratries or boroughs. One of these, the Cecropids, inhabited the rock where later the Parthenon was erected, and towards the sixteenth century before our era acquired the supremacy. One day a Cecropid named Theseus succeeded in consolidating the twelve boroughs, and with the assistance of the patricians, or Eupatrids, founded the city of Athens. But this centralisation gave rise to distrust of the patricians, a struggle ensued, the religious and political offices which had been united in one person were severed, the family organisation began to give way, the "clients" were freed, the plebs, that is to say, all persons not included in the organisation, came to the fore, and in Solon's time the organisation itself disappeared. At Rome its history is virtually the same; and no traces of it are found in the laws of Justinian. The right of primogeniture which has persisted in Anglo-Scandinavian societies is its survival.

The second case presented in the primitive paternal family is its deviation under the growing predominant influence of the enlarged clan. This deviation is a step backwards to the less developed family state in evolution, which we met with in the animals and which implies a varying disinterestedness on the part of the male in his family duties. The children are here left to the care of the mother, we have the maternal family.

We have seen that the maternal instinct is one of the most beautiful products of evolution in the birds and mammals, that it is free from all impurity and strongly consolidated, whilst the paternal instinct is an unstable compound involving several elements, one altruistic and the other egoistic, and that the latter frequently gains the upper hand. It is the same in the human species. Of the two needs which assure reproduction, the one, the sexual need, has remained imperious in man, the other, the family need, is subordinated to certain satisfactions, to certain influences. When the

family is small, isolated, in a calm environment, and when its monogamous altruism preserves its entire hold upon the husband, the wife is his companion and the children his source of joy. But when the responsibility of the husband is less engaged, when he is accustomed to regard his wife as a utility, when he becomes polygamous, and when a different interest, that which he has in the clan, distracts his attention from his family interests proper, his paternal interest weakens and gets disorganised. He behaves as does the buffalo, who is more at his ease with his comrades in the herd at large than with his females and young in his own particular herd. Of two things, one happens. If he is eldest in the multiple family of which he forms part, his need of domination is largely satisfied to the detriment of his family. If he is a subordinate, his dominion over his wife or wives and his children is lessened; he takes less interest in the performance of his duties, and gradually comes to see in his wife nothing but a means of pleasure and a breeder of children.

Such is for us the point of departure of the secondary formation of the maternal family in the human species. It is met with here and there in Asia, in the Malay Archipelago, in Polynesia, in Africa, and especially in America. It is in concord with polyandry, which is a plurality of husbands, with polygamy, or monogamy.

An early form particularly noticed in Tibet among the Todas, among the primitive Arabs and the ancient Bretons, is fraternal polyandry, which forms the passage from the paternal to the maternal form. The oldest member of one clan takes a wife from a stranger clan, who subsequently becomes the wife of his other brothers and of their nearest relatives. The first pays at the outset the entire dower for which the others afterwards reimburse him, each according to his share. The causes of this institution rest on considerations of economy, the scarcity of women, or the advantage arising from the concentration of heritages in a single family. Nevertheless, the Toda who can afford a wife all to himself, never lacks one.

Another form of which the Nairs of Malabar are the type, is as follows: the woman remains at home and accepts from the

hands of her relatives from four to twelve husbands, provided they are of the same caste, who jointly supply her needs. In this case the children never know who is their father and can only bear the name of their mother, whilst in the preceding case they had a collective paternity of the same name. What complicates the situation in the case of the Nairs is, that each of the husbands can enter into other conjugal relations of the same kind.

The third is one of the forms of marriage preserved in the Malay Archipelago. The woman remains in the family of her mother where she is engaged in its management. The husband lives and works in the family of his mother. The father is a nearer relative of the members of his maternal family than he is of his own children. The maternal uncle is the chief of the family; lacking him, the eldest son, if he is old enough; lacking both, the mother. The father does not officiate until the mother is dead, and then only while the children are minors.

Other forms are more widely spread, but are extremely variable. In Australia and America they are almost in proportion to the paternal family. Between them and the latter Tylor admits an intermediary form, the paterno-maternal. The custom of the husband to take his wife to his home, or of going to live in her home or with her clan, gives us an insight into the origin of the maternal family. It appears from the statistics of Tylor that in the tribes where the custom is for the woman to come to the house of the man, the system of calling children by the name of their father is constant; that in the tribes where the husband goes to the house of the wife, the system of giving the name of the mother is proportionally frequent; and that in those where both usages exist, the children bear the name of the father when the mother goes to the father's house, and that of the mother when the father dwells with the mother. In Australia, the chief of the maternal family is now the maternal uncle and now and most frequently the father, although by law the children are dependent on the clan of the wife. Inheritance goes now by the wife and now by the husband, especially certain articles such as those which belong to the soil. On the other hand, sometimes the boys bear the name of their father

and the girls that of their mother. As we see, we have here an institution imperfectly established, of which the origin at the expense of the paternal family is evident, and which customs, accidentally created, have caused to deviate from its natural type.

In America the institution is more consolidated. Let us take the Iroquois for example. The children bear the name of their mother. If the husband dies, his goods are divided among his brothers, sisters, and brothers of his mother; his children receive nothing. If the wife dies her goods are divided among her children and her sisters; her brothers are excluded. It is the mother who grants the hand of her daughters and who seeks wives for her sons. The Iroquois are monogamous, polygamy is forbidden to the men, but in a tribe cited by Lafitau the woman can take a second husband. The family thus constituted is the nucleus of a social organisation which recalls that based upon the paternal family and consolidated by the worship of ancestors. Twenty to twenty-five families compose a clan, of which all the members are solidary, which has a common sepulchre, its own totem, is governed by a council, lives in a common "long house" and is exogamous. Three, four, five, of these clans get grouped into phratries, the latter into tribes, the latter into confederations. Each tribe has its own totem, the individuals are exogamous with regard to the clan, and endogomous with regard to the tribe.

Does the maternal family imply the matriarchate, that is, the transfer of the authority of the household from the hands of the father to the hands of the mother? By no means. There is a division of the authority here between the father, the chief of the maternal family, and, in the case of the Iroquois at least, the mother. All things considered, the woman is the gainer. Her responsibility with regard to her children is augmented, as is also her social position. In several tribes of America she is consulted and can be the chief. The women come together in council and send a delegate to the council of the men. Among the Iroquois she is said to have had the right of veto in declarations of war, and could intervene for restoring peace. (Schoolcraft.)

In fine, the complete characters of the maternal family in its

most widely spread forms are as follows: (1) the mother is directly responsible for her children and is slightly assisted by her husband; (2) the children bear the name of the mother; (3) the system of relationship is entirely altered, and, from our point of view, eccentric; (4) the property of the mother is left to her children and to her nearest maternal relatives, and, *vice versa*, the nephews and nieces inherit the property and dignities of the maternal uncle; (5) the latter, save in the case where, as among the Iroquois, the woman plays the chief rôle, is vested with the general authority, receiving offers of marriage for the daughters or even accepting the dower which he divides with the father; (6) the maternal clan is jointly responsible for the children, avenging them when necessary, while the latter, in case of war, are obliged to rally in its defence; (7) the father acts a secondary and extremely tristful rôle.

A curious and universal fact, varying in degree, but found in all forms of marriage, is the interdiction of union between near relatives, at first between father and mother and the children (here Westermarck cites but one exception, that of the Kaniagmuts) then between brothers and sisters, between uncles or aunts, and nieces or nephews, then between cousins of the first and second degree, and subsequently even further still. When the interdiction applies to all the members of a clan regarded as of kin, although the kinship has been lost in the lapse of time, the clan is called exogamous. In certain clans of Australia this fictitious kinship is expressed in the habit of all its members calling one another brother and sister. It has been sought to penetrate the motive of the interdiction of union between relatives. None of the five or six opinions which have been advanced are completely satisfactory. Nothing corresponds to it among the animals.

The meaning of the customs consecrating marriage has also been investigated. In general the young man seeks his own wife and the girl waits until she is asked, as is the custom to-day. At first, the marriage was effected entirely without formality, as we have already seen. The request having been made of the father, and his consent obtained, the young couple depart with full knowl-

edge of the engagements which they have entered upon; protection and the satisfaction of their needs by the one, submission and fidelity by the other. In a second phase the fiancé carries off his bride by violence after having obtained her consent and that of her parents, and rarely without that consent. Generally it is a sham struggle, a simple ceremony, though at times brutal survivals of it are found in modern civilisation. It is marriage by capture. The third phase is marriage by purchase, in which the price of the bride is regulated by usage, varies with the standing of the family, or is chaffered about. The price may be another girl in exchange for another young man, services rendered by the suitor, objects, such as one or two buffaloes, or a sum of current money. The fourth system is exchange between the father and the suitor, each one giving. The fourth, which is doubtless derived from the latter, is marriage with dower, which constitutes the personal belongings of the woman. Marriage by capture is most debated. For us, setting aside the facts of stealing in a hostile or friendly tribe, it is simply a representation of what takes place in animals, and which we find again in man. The male animal desirous of conquering a female, approaches the latter, gives exhibitions of his force, and shows himself ready to combat all his rivals. The female affects timidity, resists, and does not abandon herself until the male has offered her violence. This is what we still see to-day in our towns, and in the country with civilised man; the woman who is most disposed to yield is the one who most resists.

It is unnecessary to indicate the numerous exceptional forms which marriage presents among savages and half-civilised people, such as marriages by trial, after which trial the girl accepts or refuses a suitor as is the custom with the Todas; the marriages which are not definitive until after the conception or birth of a child, or which are broken if children are not born; marriages for a fixed space of time, etc. The latter already falls under the rubric of licentiousness or prostitution, which we should be on our guard against confounding with hospitable, religious, and seignorial prostitution, of which we shall not speak.

The genetic instinct and the family instinct, although often su-

perposed, are not necessarily associated in marriage, of which the object is less to satisfy the sensual impulses of the husband than to establish a home and to have children. In the most felicitous unions, the genetic instinct of the husband, being more imperative than that of the wife, is not always satisfied at certain periods of the life of the mother (gestation, lactation, etc.). When custom and his position in life permit it, he takes to himself a second wife, and, caprice intervening, perhaps a third ; or he is, by permission of law, polygamous. But if that is not allowable he will either give vent to his impulses elsewhere, or will take to his home a concubine, which public opinion also frequently permits. As to the women, the genetic instinct very frequently leads them astray, even before marriage. The best behaved girls, so a missionary in Lower California recounts, languish after a husband. The first step is the gravest. They contract what they represent to be a marriage for a period fixed in advance at one year, at several months, or less, or for certain days of the week. Marriage of this sort thus leads by degrees to prostitution or concubinage with which among the savages or barbarians in a clan or tribe are associated all those variations of the sexual relations which are more or less accepted by usage. If we add polyandry and polygamy between two neighboring clans, we arrive at those irregular customs which are attributed to savages and among others to those assumed promiscuities, "marriages by groups" which figured in ethnography not many years ago.

Inquirers have been fain to see in this promiscuity, which is associated with complete anarchy, the first stage of man prior to the appearance of society: the political clan emerging from this anarchy, the maternal family issuing from this clan, and the paternal family proceeding from the latter. This is erroneous. The paternal family was the immediate, habitual form of association of the true primitive man as it is now among the lowest savages we know of. The family clan, afterwards political, is most commonly nothing but an enlarged family. When these clans are united into phratries and tribes, the family still persisted with its primitive patriarchal organisation. The maternal family is an accident only, a retro-

gression, which has drawn evolution into a devious way. Yet in this form it has remained none the less the fundamental element of the clans or tribes in which it existed.

Similarly polyandry and also polygamy are accidents, reversions to animal forms of marriage, aberrations of the human species. The advanced and essentially human form is monogamy, either express or concealed under different forms. Westermarck justly remarks that if one of the women in polygamy is the spouse *par excellence*, in polyandry one of the men, too, is the preferred husband. Even in the midst of licentious debauchery, as we find it among the Areois of Tahiti, each man has his own wife, of whom he is jealous and with whom he is very strict. Even in prostitution the woman contracts an alliance with some one man particularly, and makes of him her companion and protector. Monogamy is the conjugal form of the anthropoid apes, as of the lowest savages. In the first phases of civilisation it drops off in frequency, but only to increase again at a more advanced stage and to become the accepted and esteemed form. Furthermore, it is the form to which the paths followed by evolution in the animal scale logically led—the form which answers physiologically the best to the objects of reproduction: not quantity but quality of children.

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The forms or types which human society affect or have affected, from the epoch of the family or family clan to modern civilisations, are so numerous and varied that the first thing to be done, in acquiring a satisfactory point of view, is the establishment of divisions beginning with the simplest and leading to the most complex, in conformity with the principle of evolution or of their progression towards societies which we esteem to be the highest, that is to say, towards our own.

The most desirable classification, that towards which all our efforts tend, and which takes into account all the characters presented, rests upon the idea of civilisation itself. It would be something as follows: the very lowest savages, such as the Veddahs; the semi-savages, such as the Australians; the barbarians of the first, second, or third degree, as the negroes of Dahomey and of

Benin, the Indians at the time of the discovery of America; the Kalmucks of Tartary, the Gauls and Visigoths; the semi-civilised peoples, such as the ancient Egyptians and Assyrians, the Peruvians of Pizarro, and the Mexicans of Cortez; and the civilised peoples, which are divided into the Ancients (the Greeks and Romans), and into the Moderns. But on the one hand science is not in a position to fill up the details of these divisions, and on the other their lines of demarcation are not at all distinctly fixed: there are everywhere insensible gradations.

A second classification is that which we have sketched out above, based upon the idea of association: families uniting into clans, clans into phratries or tribes, tribes into cities or their equivalent, and cities into federations and nations.

The third mode rests upon the first manifestations of the faculties that constitute man. The making of tools for attack and defence, at first worked in stone by chipping, cleavage, or polishing, then in copper, bronze, or iron. The age of fire-arms should be added. It is unnecessary to say that the resulting periods are nowise parallel in the different parts of the globe, in Italy and in France, in Europe and in America. Quite recently the tribes of Lower California were still in the stone age.

The fourth mode of division is based upon the manner in which men in societies, as they increase in number and encounter greater and greater difficulties in supplying their daily needs, organise their life either by *transforming* their present means of satisfying these needs, or by *adding* to those which they already employ, entirely new methods.

Other modes of division have been suggested giving rise to other social types, but not harmonising with the general idea of unbroken progression in the same direction. Such is the division of tribes and peoples into nomadic and sedentary, into peaceful and warlike, into monarchic, oligarchic, and democratic, into individualistic and autocratic, two forms compatible with each of the three preceding.

Let us dwell on the fourth mode, which is the broadest. The lowest savages, who are broken up into small families, are either

hunters or fishers, according to the country of which they have virtual ownership, or they are both at once. They are nomads, always in search of food, as long as the season permits it. At a certain season of the year, the Veddahs are shut in by the rains, the country is inundated, and the various families seek a refuge on some rocky eminence, where they come together but do not indiscriminately mingle. Sometimes one of them will volunteer at the peril of his life to go in search of food, which, if he finds, he will divide. This is the first stage of the first period or of the hunter type. The necessity of finding certain species of game or fish on the territory of certain families was perhaps one of the first occasions of reunion and of the granting of concessions after the manner of an association. The second stage of the hunter or fisher type is found in savages already organised into clans or tribes. It is characterised by a spirit of foresight and conservation which is quite remarkable. Rules are established for the protection of useful animals and plants; hunting at the time of mating and flowering is prohibited in certain regions; general expeditions are made at certain times only. The Americans of to-day evince nothing like a similar foresight when they suffer their forests to be burned and devastated,—forests which even now are in many places utterly shorn of their most beautiful original species.

The second period is that in which man, seeing his customary game diminish as the number of hunters increases, and under the pressure of hunger, takes a step farther in the direction of foresight, gathers together in some enclosure the animals which form his customary food, subjects them to domestication, or leads them in herds to the pastures which they successively exhaust. This is the pastoral period which has persisted to our day among a great many peoples and which is essentially a nomadic stage.

The third period, which frequently sets in at the same time with the preceding, is that wherein man applies himself to agriculture. Two forms are met with here. In the one the culture of the soil is intermittent; man plows and sows, pastures his flocks while living a nomad life, and then returns to the tilling of the soil. In the other, man is sedentary; he inhabits houses with his wife and

children, who assist him, or he dwells in villages. This kind of life is eminently favorable on the one hand to the patriarchal family grouped about its patrimony and consolidated or not by the worship of ancestors, and on the other, to individual property spontaneously created at the outset by simply taking possession of, breaking, and working undisputed land. In primitive societies which devote themselves to agriculture, there is generally collective property of the soil vested in the clan which sometimes culminates in the periodical distribution of lands not reserved; there is also family property, included in the preceding, being the outcome of family labor, and being handed down from generation to generation according to certain rules; and finally there is personal property. In our modern societies the state is still theoretically the owner of the soil, it takes possession of it again whenever it wants to for reasons of public utility. For a long time the cultivation of the soil was not held in high repute, the profession of the hunter or warrior was a far nobler one as affording evidence of the individual valor of man. Later, even in civilised nations, it was voluntarily entrusted to slaves. In Athens, the laboring class was among the lowest. This way of looking at things has changed since schools of economy have taught us that the goods of the earth are the source of all true riches.

The fourth period, or fourth type, did not assume importance until later, but it has its roots in the first phases of society. Exchange does not exist among animals, and is one of the precocious manifestations of the human mind. It is discovered during the second stone epoch in France. It is derived from the obtrusive fact which spontaneously came to notice, that one individual excels in the making of instruments, another in the chase or in fishing. The first says: "Give me what thou hast, and I will give thee what I have." This is barter or exchange in kind. Shortly after the first rejoins, "Do thou go and hunt for me, and while absent I will protect thy family." We have here exchange of services. This phenomenon takes place in the clan or tribe. Later, certain individuals, adopting definitively this kind of specialisation of labor, set out on voyages in quest of the scarcest materials, and con-

sequently those most in demand, for example, good flints which are easily worked, shells for ornamentation, cattle, etc. The distribution of such objects was not always easy. Some one would want something and would have nothing to give in return that the other needed. The needs of the day and the morrow varied. Some conventional object of value was then adopted as a medium of exchange, such as cattle, tobacco, wampum. The latter, being more portable, became the current money, and afterwards was succeeded by pieces of metal and letters of exchange. Little by little the individuals seeking their subsistence from this species of labor multiply, and the advancement of navigation widely extended their sphere. An entire nation, the Phœnicians, abandoned themselves passionately to its pursuit. With them the *commercial* type was born, that is to say, a society not exclusively devoted to this kind of work, but associating it preponderantly with other means of satisfying the national needs. In the same perfection this type is not found until centuries afterwards in the Jews of the Middle Ages, and in the Hanseatic and Italian ports.[1]

As to the fourth period, or the fourth type, its roots are more deeply embedded in the past of man, but it does not attain an advanced stage until after the preceding period. It is the *industrial* type. The manufacture of stone, bone, and ivory instruments was its first stage, that of household utensils, of jewels, baskets, matted fabrics, and canoes the second stage. More than any other manifestation of the human mind, it reflects the latter's progress in satisfying the needs of daily life. The multiplication of needs which it gives rise to, the comfort which it brings with it, the luxury to which it tends, the need of wealth that results from it, are the most palpable measure of the degree of civilisation attained. There were shops for the manufacture of glass and pottery, for weaving and dyeing in Egypt from the fourth dynasty. The Pompeiian collection of the Museum at Naples shows to what a stage industry had arrived in the first century of our era. The art of war was one of

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[1] Blanqui, membre de l'Institut, *Histoire de l'économie politique en Europe, depuis les Anciens jusqu' à nos jours.* Paris, two vols. 1860.

its stimulants in all epochs. With printing, steam, and finally with electricity, progress took an accelerated pace. The Museums of Ethnography, like that of the Smithsonian Institute at Washington, and the Polytechnical Museums, like that of Kensington at London, trace backwards its evolution. The history of the industrial social type is divided into two sub-periods: the one in which the individual, having as his sole possession his arms and hands, and still enjoying by virtue of his muscular force high esteem, preserved his relative independence; the second, in which the individual is outstripped and soon afterwards conquered by machinery with which he cannot compete and which, as its powers grow, finally takes his place.

Then appears what we deem necessary to regard as the sixth period, a sixth type, the present, the *intellectual* type. These machines, to say nothing of the science which has created them, are the material incarnation of the intellectual power of man, ultimately gaining the ascendency over the muscular or animal force of the early ages.

Mind, having been *par excellence* the weapon of man in his struggle against nature, could not help culminating in such supremacy. It is the ultimate term of division and specialisation of labor for the satisfaction of needs of all kinds. The consequence is that the conditions underlying the social relations between man and man have totally changed, and that the great problem of the twentieth century will be that of finding the best adaptations to this new state of things. The twentieth century ought rationally to be the pure reign of intelligence.

It will surprise some, perhaps, that to the six types named, to-wit: hunting, agricultural, pastoral, industrial, commercial, and intellectual, we have not added the military type to which Mr. Herbert Spencer attaches so much importance. Our motives for not having done so are as follows: (1) What gave rise to the six preceding types was the necessity of living, of multiplying or transforming the means before employed in supplying the urgent needs of life. Militarism belongs to an entirely different order of ideas. It grew from the need of defence, and later, in response to other

needs having no relation to necessity. (2) It has existed at all times, parallel with the types cited, save in countries where the topographical characteristics themselves formed a natural defence. (3) It appeared early, was the result of no social type, and engendered none. It varies and is hostile to all the social types. (4) There would be just as much reason in admitting a clerical type, likewise appearing as soon as men united in groups, accompanying all social forms and resulting from a like particular need. (5) Perfectly rational at the start when it was used to defend the home, the clan, the tribe, or to maintain the collective independence of the latter, or even in expeditions into neighboring territories in search of food which was lacking at home, militarism subsequently became the expression of man's desire of dominating, of displaying his power, of satisfying his pride when it was not, even worse still, madness, or sheer debauchery in blood. The six types which we assume, may have their defects by the side of their advantages, but they are certainly a logical consequence of amelioration, stages in the path of social progress, which cannot be said of militarism.

Militarism in its legitimate, primitive form is but a reflex action, the same which impels the frog when deprived of its brain, to contract its leg when pinched, or the lion to throw himself upon the hunter when wounded, or the cercopithecous monkey to organise expeditions into corn fields for the satisfaction of his hunger. The difference in the case of man is that the animal rarely attacks and destroys without necessity, while man ultimately comes to doing so from sheer passion.

The evil in the case of man dates from the day when it was necessary to nominate the chief of a clan, and when the chief in question, together with his followers, saw in war a means of strengthening his position and of becoming powerful. At the start, every man able to handle a weapon was a soldier. Some were brave, others pusillanimous. The first were hailed as heroes on their return, the others were despised. The first necessarily were the recipients of favors, were consulted in council, had the best places reserved for them at the ceremonies, were invested with definitive marks, honors, and privileges. Selection spontaneously set in and

there arose a class of warriors. The warriors multiplying, their importance waxed great, they looked upon themselves as a superior class, treated the rest with disdain, became proud, arrogant, and finally asserted high prerogatives in the conduct of public affairs. Coming to an understanding with the high dignitaries of which they were the pillars, such as the chiefs, the fathers of families and the priests; having the forethought to appropriate the major part of the spoils of war, and consequently increasing in wealth, their influence also increased. The administrators of the state were recruited from their ranks. Gradually they came to look upon the state as their special work, as their peculiar property, and in the laws which they helped to establish they ultimately identified their own interests, whether as a class or as individuals, with the interests of the people. The others below them were humble and subordinate and possessed only nominal importance.

At the origin, war was rational. It subserved the defence of all and was kept within bounds. Savages as a rule never push hostilities beyond the necessary point. The Australians often substituted for it single combat by groups, the conditions being fixed in advance as in a duel. The Tasmanians, when the war was ended, clasped hands and forgot its originating offence. Hostilities were not perpetuated. But when the chiefs whose power sprang from war alone and the professional warriors became the ruling element, peace was often only a truce. Attacks were wilfully made under the pretence of making conquests and establishing empires, nations advanced in hordes in search of new and rich countries, pillaged cities and bore off prisoners of both sexes. Foraging expeditions were converted into outright robbery. War became a lucrative profession, a man-hunt, a royal pleasure, the highest glory.

Thenceforth the populations were divided into conquerors and conquered, within as well as without the city or empire. Every state was divided into two bodies, the slaves and the citizens, distributed into classes. Slavery in all antiquity was a scourge of blood, sometimes dissimulated under highly civilised appearances. Everywhere here, we see men whose only wrong was that they had been unfortunate on the day of combat, valiant men, sound in body and

mind, curbed under the hands of a master, enfeoffed in a society having different manners, a different tongue, frequently different laws, and different gods from their own. I say different laws, but no. For them there were no laws. They had lost all quality of manhood.

Our great modern states, the absolute monarchies, with all their classes of nobles and courtiers, are the product of war. The chiefs divided up the conquered countries among themselves and became so many rivals, disputing for the available spoils. The least happy are the vassals, the happiest the monarch. But the latter having reached his position by war is compelled to maintain it by war. He must encourage the ardor of his partisans, must distribute among them new lands, and shower upon them riches and honor. The property which we saw to be natural in its origin, thus becomes the prey of the strongest. Then feudalism is born. The true society, the society of the workers, disorganised, shattered and perverted in its whole mechanism, thenceforth was left to establish itself as best it could, parts in towns where they established communes and obtained by dint of perseverance guarantees protecting them in their work, and parts in the country under the protection of feudal castles on the lands of the seignors in whose favor they alienated a great part of their liberty for the permission to live.

These times are gone, people say. Militarism has changed their characteristics. But has the change been so great? When war breaks out, is it less horrible in its methods, less sanguinary, does it absorb less of the resources of a country, does it not destroy in less time the fruits of years of labor and saving?

War has not only its evils of the moment, and disasters which are soon repaired; it has also its reactive influence upon morals within. It habituates the minds of people to certain ways of thought it teaches them the law of the strongest, causes man to lose sight of justice, and inculcates that there are two schemes of ethics, that of ends and of success and that of failure. So long as war is not suppressed, the aspirations of philanthropists will be ethereal Utopias. With Mr. Spencer it must be admitted that contemporary militarism, however legitimate (for one nation cannot suffer itself

to be devoured or molested by another), is the grand calamity of the day, the disgrace of humanity, and that in this respect we civilised people do not stand as high as the Veddahs or the Australians.

By the side of militarism, which is an animal manifestation of our organism, still presiding over the relations of peoples to each other and forming an outward evil of society reacting upon it interiorly, there exists another social evil which works wholly within but which is not less grave.

One of the first phenomena which the beginnings of human society present, and which bear some similarity to the formation of animal colonies by associations of merids, is the division and specialisation of labor. This division begins in the family between the husband and the wife; it is continued in the clan or tribe between individuals; it becomes established and spreads with the growth of the population and as the means of living become more difficult; it attains its maximum extent in our present complex civilisation. One of its results is the breaking up of societies into classes and professional groups whose number is constantly increasing. The class which appears first is that of the fathers of families or of the elders on one hand, and of warriors on the other, which by fusion become the superior class, that which the chiefs, the administrators, and the magistrates affect. The sacerdotal class then forms and soon becomes associated with the preceding, which has need of its services in swaying the populace. The third, fourth, and fifth social types which we have described give rise to the following: the agricultural class, the merchant or commercial class, and the artisan or industrial class. The last embraces all that is not included in the five preceding, all those whom the family organisation not having incorporated has left without a home or domestic gods, those who have never been able by perseverance or their own worth or by favoring circumstances to succeed and rise, the day-laborers who live from hand to mouth, the tramps, outcasts, and outlaws. The slaves on the one hand and the strangers on the other, are classes apart. In Athenian times, a while previously to Solon, the proportion of the population was as follows: citizens of

all classes nine per cent.; strangers subject to severe restrictions, eighteen per cent.; slaves, seventy-three per cent. The warrior, magisterial, and priestly classes were the higher classes; the merchants, the artisans, and the agriculturists formed the middle classes; the common laborers, the lower class or plebs. But the division did not terminate here. The middle classes were subdivided into professional groups, such as sedentary or pastoral agriculturists, fishermen, sailors, carpenters, shoemakers, scribes, interpreters, etc. These classes existed virtually as such or they were consecrated by laws; some were closed and hereditary, others open; a person was born, for example, warrior or priest. In Egypt, according to Herodotus, there were five classes, according to Diodorus, seven. But the latter must have confounded classes and professional groups, and then have omitted some of the last. The word "caste" seems to have been reserved for closed groups such as they existed in India.

In India, or, to be more precise, in the Punjab, there were originally, according to the code of Manu, four classes: the Brahmans or priests, the Kshatriyas or warriors, the Vaiçyas or husbandmen, merchants and artisans, and the Çûdras or servants. The aim of this classification was to prevent a mingling of the conquering Aryans with the Dravidians, and consequently the absorption of the former. The first caste was composed of Aryans supposed to be pure, the second of Aryans and Dravidians crossed, the others of Dravidians. The black aborigines were excluded from the classification and bore the name of Pariahs, a term subsequently invented. Afterwards the castes were modified although the first suffered the least. Numerous intermediary castes were engendered, that of the Vaiçyas in particular was divided into a great many sub-corporations, each having its particular customs, laws, and religion, endogamous with respect to themselves, exogamous with respect to one another and then giving rise to other castes. There was, for example, the caste of Kayasthas, or scribes. We have legends concerning its origin, but none of them are trustworthy. It is divided into four sub-castes and each of these into sections, each comprising a certain number of families or family clans. According to the

census of 1881 there were in India two thousand five hundred castes of this kind, not including lesser divisions.

Classes, or open castes, are according to the nature of things, and in themselves no evil. They are a logical stratification. One passes from layer to layer, rises or descends according to one's starting-point and the success or non-success of one's conduct. But this is not the case in closed classes and corporations. When a strong superior authority, special customs, religion, or secular routine have enervated the character and strained the resiliency of individuals, pushed resignation to the point of self-abandonment, then castes become perpetuated with all their faults and merits. They perform their work as the specialisation of labor requires it, but that is all. When on the contrary the individual is active, thinks, desires to be happier, preserves in himself the stimulants that make man, the feeling of solidarity and of general interest is established, aspirations are joined, the caste or corporation becomes an individuality opposed to those of other castes, competition with the latter is aroused and grows great, and at the same time the idea of equality and inequality, the desire of struggling and of having the same enjoyments, the same rights, and of conquering.

It is the war of classes, unknown in India, in Egypt, and in all countries where in the lower states of society the spirit of liberty has faded or never been roused, but frequent in Greece and Rome and in modern civilisations where the general level is higher. When individuals live in contact with one another, are not utterly ignorant of what is going on about them, when they exchange, be it ever so little, their thoughts, which happens in towns more than in the country, especially in the liveliest, the effect is inevitable. The isolated individual is pliant and submissive. Banded together, individuals support one another, lend themselves more easily to enthusiasm, and are ready to follow the most audacious leader. Hence in the lower classes there exists always a latent protest against the inequalities in the distribution of happiness, a silent rancor which the habit of submission can alone suppress. Hence the intermittent explosions of the disinherited classes, the governed against the governing.

The complement of the struggle between classes is that between individuals, to which we shall have too much occasion to revert to insist upon it at the present moment, and which the works of Darwin have placed in prominent relief. The evils of militarism are patent and striking. The drawbacks of that inward evil which also is gnawing at the base of society and attacks both individuals and classes are hidden, and, if I may use the expression, interstitial.

P. TOPINARD.

PARIS.

THE BASIS OF MORALS.

A POSTHUMOUS PAPER OF AN ANARCHIST PHILOSOPHER.[1]

> "To philosophy gravity is nothing but the law of heavy bodies; and therefore morality can be nothing but the law of animal action."—*Barratt.*

MORALITY has ever been a fruitful theme for speculation, and engaged the attention of the profoundest minds. A theory of moral sentiments and the rationale of "right" conduct has entered into every philosophical system of the past. From Plato and Aristotle to Darwin and Spencer rival theories have found valiant defenders, and their respective views of conduct underlain and colored their systems of thought. But the modern student has no need to ponder over the musty tomes of by-gone speculation in considering this subject, for the wider generalisations of the doctrine of evolution here, as in all other problems, have opened new paths and grander vistas in hitherto unexplored directions.

The problem of ethics is primarily an inquiry into the source, rather than the course of action, for the source being definitely formulated, the course of actions may be clearly defined under the respective heads of "right" or "wrong" conduct, and its ultimate end deduced as a logical sequence.

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[1] DYER D. LUM was an anarchist. He came of an old New England family and was born at Geneva, N. Y., February 15, 1839. The composite picture of his ancestry shows (as he used to express it) "the minute-man with his rifle ready for use between prayers," and on his maternal side the dim figure of an English crusader commemorated in the coat-of-arms of the Tappan family. He was a bookbinder by trade. During the civil war he served as a volunteer and took part in some of the hottest battles of the Rebellion. When captured, he escaped from prison, and was at the close of the war breveted Captain of Cavalry. In 1876 his name appeared on the ticket headed by Wendell Phillips as Lieutenant-Governor

The respective schools of ethics may be loosely classified as the empirical and the intuitive. While there is little difference between them as to the moral nature of particular actions, they differ widely when attempting to explain the source of authority inherent in the world-wide recognition of the moral *ought* as a "categorical imperative." John Stuart Mill states this very explicitly when he says that both schools recognise "to a great extent the same moral laws, but differ as to their evidence and the source from which they derive their authority. According to the one opinion, the principles of morality are evident *a priori*, requiring nothing to command assent, except that the meaning of the terms be understood. According to the other doctrine, right and wrong, as well as truth and falsehood, are questions of observation and experience."

The pre-evolutionary moralists were mainly intuitionists, whether finding the source of moral ideas in the *eternal reason* or *fitness* of Cudworth or Clarke, the love of order of Malebranche, the

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of Massachusets. Embracing in all political questions the most radical cause, we find him as a leader of the Greenback movement, then as a socialist, and at last as an anarchist.

He was a fluent speaker as well as a ready writer, and contributions of his, both in prose and verse, appeared in various periodicals. It is characteristic of the broad range of his pen that one of these journals was *The Catholic World*. He served as a member of a committee appointed by Congress to investigate the labor troubles some years previous to the Haymarket riot, and when, after the throwing of the bomb, seven anarchist leaders of Chicago were tried for conspiracy, he rushed to their assistance and acted as their friend and adviser. His anarchism was not the anarchism of Spies, nor that of his more intimate friend Parsons with whom he had been associated on one and the same committee for the investigation of the labor troubles; but he saw in them victims of the cause of liberty, and that sufficed for him to befriend them. When after the trial the cause of anarchism became unpopular, Dyer D. Lum was naturally ostracised and lost many of his former friends. Financial troubles completed the failure of his last years, but he endured the most exasperating privations without complaint until the end. On April 6, 1893, he was found dead in a lodging-house on the Bowery in New York and the papers reported that he died of heart disease.

His essays, scattered through the back-numbers of various periodicals, characterise throughout the zealous love of freedom that marks his life. They are not always consistent, sometimes reckless, but then again indicating a deep insight, for he was a close student and a keen thinker. In his last years his interest became more and more concentrated on philosophical and psychological problems, involving the main question of practical life, the basis of ethics. His posthumous essay on ethics, which is here published for the first time, was deemed by himself as the maturest and best of all his writings, and he left it to the world as his last bequest.

love of being of Jonathan Edwards, the *moral sense* or *conscience* of Butler, Hutcheson, and Mackintosh, the sympathy of Adam Smith, or the recognition by the intellect of *moral beauty* of Dugald Stewart. On the other hand, the inductive or empirical school from Leibnitz, Hartley, and Paley to Jeremy Bentham have revived the ancient Hedonism of the Cyrenaic sect by affirming "pleasure" or "happiness" to be the sole motive for action and criterion of "right" conduct, whether viewed from the personal standpoint (Egoism), or from that of "the greatest good to the greatest number" (Utilitarianism). The successors of Bentham, such as Bain, Grote, and J. S. Mill, under the all-absorbing influence of evolutional conceptions, have so idealised Hedonism that but little of the pattern of the original texture is left, though a few crass theorists still exist as "survivals."

In the works of late writers on ethics, such as Spencer, Sidgwick, Stephen, Simcox, Thornton, Barratt, Courtney, Maude, Sorley, Wake, Owgan, and others, it will be seen how great is the divergence, even among those who accept the empirical method, no two of which agree on several vital points. From the great expounder of Egoism and royal authority, Hobbes, to Herbert Spencer, however wide the variation, "pleasure" remains the controlling motive in conduct. While among the writers of what is generally called the Evolutional school, we find more or less dissent from the "ego-altruism" of the expounder of Evolution—Herbert Spencer.

In such a conflict of opinions among those whose names adorn the literature of the day, it may seem temerity to attempt to recast this much debated problem and to seek the guidance of Hera to pass the dangerous straits of Scylla and Charybdis, yet the conviction that the science of morality has yet to be formulated, forbids thought to cease tentative efforts. Pleasure or happiness, which one school makes the result, the other the source or motive of "right" conduct, discloses a hitherto impassable gulf which Evolution must bridge over. The pure egoism of Hobbes and his inane followers who are attempting to adapt the conclusions of the royalist to individualistic philosophy, as well as the utilitarians of

Bentham, have both been supplanted by evolutional ideas, and the present tendency to recast them upon an organic basis offers an opportunity to apply later thought to ethics, for the transition from Hedonism to modern scientific thought has not yet been clearly made. The evolutional school has achieved such a result in the old-time controversy relative to the "forms of thought" in reconciling the intuitive and empirical schools, by demonstrating that what may now be conceded as innate or intuitive was originally acquired by experience, and through heredity becomes organised into mental structure. The same must be done for Kant's categorical Ought. Accepting evolution, therefore, as the philosophy by which all theories must be tested, we must seek such a reconciliation as will not only enable us to generalise a fundamental law from facts, but be subject to verification, and thus held within the lines of the knowable.

"Science," says G. H. Lewes, "is built up from *abstractions*, and these are built up from *concretes;* but no abstractions must contain more than is warranted by the concretes." How true this is needs but a moment's reflexion to see. Facts alone can but constitute the raw material, so to speak, of science, which begins with generalisations. We abstract from facts particular data in which there is common agreement, and this abstract generalisation we term law; not in the sense that law determines phenomena, but is determined by them—is their formula.

A scientific conception of social relations must follow the same method of procedure. In ethics our facts are subjective relations affecting conduct, and the generalisation or "law" we seek must be an ideal abstraction; one not alone determined by present phenomena, but by the past, and affording us a Type for which we may scan the future, thus rising to a higher abstract conception, yet in accordance with its concretes, by which both the source of "right" conduct may be defined, and its ultimate end determined. Conduct, past, present, and future; the crude conceptions of the primitive races, the highest aspirations of living souls, as well as the ultimate aim of human conduct—the goal of progress—must be brought under the scope of one general law, which, while in

agreement with all the multitudinous facts of past phases of social life, and explaining their shortcomings, will present us with a moral Type consonant with the empirical genesis of what may be admitted to have now become incorporated into organic form; but at the same time affording an inspiration which will illume the present with the conscious recognition of an Ideal in which may be seen reflected "the glory of the human."

How far the current theories of ethics approach this standard, we may the better understand by a rapid criticism, which will also the better enable us to grasp the fundamental law constituting the basis of action, and determine both the nature of "right" and give shape to the requisite determining rules of conduct. For this purpose we may divide current theories of ethics under four heads:

(1) Egoistic Hedonism; (2) Universalistic Hedonism (Utilitarianism); (3) Intuitive Ethics; (4) Evolutional Ethics.

1. Egoistic Hedonism.— Hedonism, from the Greek ἡδονή, "pleasure," makes this the sole motive for action.

When Mill says, "Happiness is the sole end of action," the Egoist limits this to the individual ego; in the words of Barratt, "The individual ever acts to secure his own pleasure." It is unquestionably true that life consists in adaptation to environment, and that pleasure accompanies adaptation. The fundamental principle of Evolution, natural selection, carries with it the necessary conclusion that normal life involves at least the absence of continuous pain, which may be positively defined as pleasure or happiness; further, it may be conceded that in the moral world good and evil are the synonyms of pleasure and pain, but it does not thereupon follow that "pleasure is the only motive power."

Egoistic Hedonism ascribes to Self an independence it does not possess. Notwithstanding the stress now laid upon what Hobbes ignored, the Social Organism, the objection remains. We smile to-day at the last century conception of the mind as a *tabula rasa*, as typified in Condillac's marble statue, yet the Egoistic theory commits a similar error in virtually separating personality from hereditary conditions which determine it. By positing personal pleasure as the source of action, its logic tends to exalt self above

that which has conditioned it, above the brute, and merges all conception of "right" into temporary self-gratification, and in thus making the criterion purely egoistic, eliminating conscious recognition of over-lying social requirements. But the chain of sequences in states of consciousness to which in thought we ascribe personality is dependent rather than independent, more controlled by, than controller of, actions. The *ego* is the expression of the organism, having its roots deep in its *affective* nature; in other words, it is the consensus of psychical functions of an organism. In the moral realm it is but a cell in the social organism, shaped by antecedent causes determining both organic functions and its function.

Pleasure is a *resultant* from adaptation rather than its cause. Cattle ruminating in a meadow present us with an instance where pleasure and adaptation are one, but egoistic desire for pleasure cannot be predicated as their actuating motive for gratifying the affective desires of organic structure and the adaptation the result. The actuating cause lies back of the desire.

Are pleasures to be compared and scheduled in order to determine the requisite maximum of "right" conduct, or left to impulse? That pleasure is not the motive is seen in the well-known "paradox of hedonism," which is given by Dr. Courtney thus:

> "If there is one thing more certain than another, it is that to do an action because of the pleasure it brings is precisely the way to lose the pleasure. Pleasure, therefore, which is what we are told to aim at, is exactly that which we must not aim at if we desire to secure it. A paradox, indeed, when the end of human activity is found to be secured only on the express condition of not making it the end of activity."

There is nothing better established by the new Psychology in supplanting the methods of metaphysical introspection by that of scientific research, than that underlying all personality are the organic, or systematic, sensations; "a voiceless deep" existing in all organic life, the crests of the waves of which only possess the phosphorescent light of clear consciousness. It is by the variation of environment that these systematic sensations are often raised to the surface, when the *ego* first becomes conscious of them. These often affect us, producing, for instance, a sense of general depres-

sion, and in which the sum of all psychic states that we dignify with the term *ego*, the *me*, takes on a new character. Indisposition, down-heartedness, gloom results, and the supposed controlling ego is presented with the paradox of seeking pleasure in the absence of pleasure!

However loudly pleasure may be asserted to be the sole spring of action and criterion of "right," it remains doubtful whether as the source of action it has not produced as much pain as adaptation. More, it still remains to be proven that the most complete adaptation to environment can as yet bring more than the physical pleasure of well-fed cattle. The problem which confronted Gautama Buddha, the eternal hunger and the thirst of the mind, ever more keen and painful to sensitive souls the more it is gratified, the unceasing correlation between higher aspiration and ungratified desire, the wide desert of mental pain in which pleasure constitutes but oases to inquiring souls, still remains unanswered by Egoistic Hedonists. However applicable their theory may be in seeking greater comforts and pleasing "affinities," as a rule for determining conduct it signally fails.

> "Those mighty spheres which gem infinity
> Are only specks of tinsel fixed in heaven
> To light the midnights of their native town."

"A human being is the possibility of many contradictions," says Schopenhauer, and nowhere is this more manifest than in the interaction of the two great opposing principles which converts every soul into a battle-field. Organic desires underlie and are *anterior* to development of intellect; the new born babe manifests will before a sense-impression has been registered. In more mature years the animal and the human are never in accord within us, because the war unto death between organic desires and intellectual judgment has begun. But pleasure, as the source or action, has its root in the gratification of our desires, and often persists long after reason has demonstrated its folly. The Hedonistic assumption, then, in so far as it applies to man (where, indeed, moral relations are confined) is based upon organic impulses and not upon

his higher intellectual, or human nature, to which it is often directly opposed.

A more rigid examination of actions show us that race-maintaining conduct, rather than individual pleasure, is that upon which nature places her seal of approval, and that, in the evolution of species, the pleasures as well as the life of the individual are ruthlessly sacrificed, or left to decay, as soon as race-maintaining ends have been met. Consequently it is a theory which thus places "the cart before the horse."

2. *Universalistic Hedonism, or Utilitarianism.*—The most eloquent and at the same time most idealistic of all this school, John Stuart Mill, says:

"Actions are right in proportion as they tend to promote happiness; wrong as they tend to produce the reverse of happiness."

The essential difference between this school and the Egoists is in seeking *general* happiness, which they find in utility or expediency, wherein consists:

"The rules and precepts of human conduct, by the observance of which an existence such as has been described might be, to the greatest extent possible, secured to all mankind, and not to them only, but so far as the nature of things admit, to the whole sentient creation."

But even to this ideal picture exception must be taken, for like its ally, the theory of Egoism, it is open to objections.

Based upon the assumption that what was at first willed because it was desired, comes to be desired because it is willed, it leads to the fixity of habit, and thus ignores the patent fact that conduct however fixed is not stationary, but ever evolving to broader relations. Utility as a causative motive fails to explain this underlying impulse to broadening out the idea of "right" beyond the utility of any existing age. Time was, for instance, when slavery was useful and expedient, as well as merciful to the doomed captive, for without it mankind might hardly have acquired the habits of industry. While not claiming that at that period of social growth slavery could be called "wrong," the utilitarian hypothesis fails to account for the genesis of the idea that it is in fact "wrong" and

not "right," an idea which had to battle for ages with what utility had fixed into permanent status as "right," and, consequently, this growing moral protest as "wrong."

Its distinction between virtuous and vicious actions is not clear, as the same act in the same age may be classed as both in different countries. The one as well as the other tends to become fixed in custom as expedient, and hence "right" as comparative morality abundantly shows. Hence, we have contradictory codes simultaneously existing and against which a growing moral protest rises from the unconscious, which is not seen to be either useful or expedient until long after it has manifested its presence and undermined the existing utilitarian "right."

The expedient in one age is thus seen to become by unconscious growth inexpedient in a later, thus leaving conduct on the shifting sands of a temporary requirement, not subject to general law, and hence beyond the domain of scientific examination. The aim being the greatest amount of possible happiness, the realisation of this should be the cessation of all effort, while in fact the greater the attainment the larger the desire becomes, and the fixed boundary is seen to be inadequate; the fuller life's cup becomes with the realisation of happiness, the more it is embittered from happiness denied. As in the nervous structure, the keener the sensibility the more acute is pain, so in the psychical nature, the further we explore the sea of happiness the wider grows the expanse of the unattainable, and heavier on the soul rests the philosophy of disappointment.

Expediency or utility, like pleasure, follows action, instead of being its source; and in basing a philosophy of conduct on the reverse statement of facts, the tendency is to institute as "right" what time has often subsequently decided to be "wrong."

3. The Intuitive School.—The intuitionists affirm for man a "moral sense" by which there is assumed an original quality in actions irrespective of their consequences, through which "right" is immediately cognised by the conscience. While admitting what none deny that "right" actions conduce to the well-being of mankind, they claim that this is because they are in accord with "eter-

nal reason" reflected in conscience. The moral quality of an act, therefore, becomes independent of experience which can but confirm this inherent nature and is cognised by an inner sense which distinguishes man from animals, enabling him to make his own affections objects of thought. This, the logical presentation of the claim, directly controverts the doctrine of Evolution, by drawing a sharp line of demarcation between human and animal intelligence, by giving to the former an innate and metempirical perception of an external moral order of the universe, adding to the known functions of the organism a supernatural gift or faculty by which at all times man has been, or could be, enabled to perceive absolute truth; and this irrespective of their differences in seeking it in the intellect or in the emotions.

The Intuitive School is fundamentally metaphysical, or speculative, being based upon no known concretes by which its assumed generalisation may be made subject to verification. It takes man at the high mark of culture and by introspection assigns to all men similar potential capacities. It is unscientific because its alleged facts and laws are never reduced to verification, being arrived at deductively rather than inductively. Its innate moral sense as distinguished from an evolved social sense, is beyond and above science, metempirical, confined to the subjective sphere without genetical connexion with the external world. More, it is at direct variance with what we know of the lower races. Consciousness gives only results, never processes; these are secreted in the subconscious, more and more recognised as overshadowing the conscious, and to which we owe genius, inspiration, impersonal creations. But this "power not ourselves which maketh for righteousness" exists as such in consciousness only, and we cannot say it precedes it. That which in every great thought and deed overflows the submerged consciousness, which not only inspires the highest but consoles the lowly, which from the simplest irritability of organic matter has flowered in sociality,—this the doctrine of Evolution finds in the Social Organism, "in whom we live, move, and have our being."

Conscience is thus seen to be the accumulated and registered

experience of the past, not a moral faculty bestowed by an external, unrelated power. Instead of a judge seated within passing sentence upon actions in accordance with "external reason," it is the voice of approval or reprimand of the general mind. Consequently the voice of the moral sense, in the light of evolutional knowledge, becomes but the accumulated convictions of past generations, woven by time under social reactions into structural form, and made organic by the habits of ages. The child born at this stage of progress among us comes into existence with a far wider scale of emotional keys in its nature than our ruder ancestors; keys capable of responding to the slightest sympathetic touch, and producing, as it were, a harmony in action which we term moral, and which alone merits the name divine.

The Hedonist, ignoring the primary impulse, proclaims an effect a creative cause. The Intuitionist, perceiving the fatal weakness in this argument, assumes a metempirical cause, lying outside of and beyond verification, to account for what the known facts of human nature fully explain.

4. Evolutional Ethics.—From the character of the criticisms offered it is clearly seen that a strictly scientific theory of morals is to be sought in the fundamental laws of our nature. The continuity of sentient existence presents no break, and the subjective aspect of relations which we abstract in thought as morals, in constituting the flower and glory of conscious life, must have root below the surface level of consciousness, in the great sea of the Unconscious and find its correlative aspect in the physical world. All instincts, before becoming organised as such, imply a *raison dètre*, an antecedent impulse, the origin of which enters into every biological problem. Underlying all specialisation of function known as instinct, we find the so called instinct of self-preservation;[1] for it is but the reverse method of expressing adaptation of environment, a generalisation of the reaction of the organism to conditions

[1] "The so-called instinct of self-preservation is a fiction. The only impulse at work there is the shrinking from pain; and this in the matured expression leads to the intelligent act of self-preservation." G. H. Lewes; *Problems*, I., p. 162.

essential to all sentient existence. The expressions: life, adaptation, self-preservation, are identical propositions; the latter two being but objective and subjective methods of expressing the modes of the first. Instead of saying that self-preservation is an instinct seeking adaptation to maintain sentient existence, we may view their separation but as an artifice of the logical understanding by which we contrast two aspects of phenomena, and which has no existence outside of the conditions which constitute it.

But adaptation and self-preservation have a far wider range than that of individual life. Self-preservation is fulfilled in the life of the species rather than in that of the unit, the adaptation requisite being that of race-maintaining conduct. This is very clearly seen in a comparative study of longevity among species. The strongest of all instincts, one having its roots in the fundamental laws of life, is the sexual, and upon the fulfilment of this race-life depends. Now, as a matter of fact, running through all sentient life from moner to the most complicated structure, duration of individual life is seen to be commensurate with the length of time requisite for the sexual instinct to fulfil race-requirements. This is a universal rule, from the bee which copulates once and dies in the act to the elephant, and some birds, whose life extends through two centuries. When that period is reached where race-maintenance no longer requires the individual, decay begins and death results; the "rounded end of life" is met notwithstanding personal yearnings.

The crowning glory of evolutional thought is the logical precision it has given to Comte's conception of the Social Organism. Change has been progress because it has consisted in growth from homogeneous units into a heterogeneous organism. While our individual functions are determined by the Cosmos, our general functions arise in the social medium, hence morals emerge. We are thus brought to see why it is that social instincts control and restrain egoistic "impulses." In the physical world we find "Nature, red in tooth and claw," making "the struggle for existence" a relentless conflict for position, in which the weaker are sacrificed that the stronger may survive, because the conditions are unalter-

ably fixed to which life must conform. But in the social realm the conditions of life no longer present similar rigidity. Being a province wrested from physical nature by the interaction of social forces, the conditions governing the struggle for existence are more largely artificial than natural. We further see that all social progress has consisted in the removal of restrictions by which more equal opportunities have given greater scope to the development of natural capacities. Thus the struggle for existence under social relations becomes transformed into a constantly progressive social selection of wider freedom to each, leaving to the Social Organism the interblending of diverse efforts to the uplifting of the race into a grander harmony than the external world can present, and the harbinger of a future when morality and sociality will be seen to be intercontrovertible terms evolved under one general law.

We thus find the genesis of the idea of "right" consisting subjectively of a constantly evolving moral sense, so to speak, of equal claims and equal dues; and objectively as adaptation to the requirements of ideal social relations; hence, giving us the basis of morality in the process of natural selection as *the Law of Equal Freedom.* This cannot be identified with the Hedonistic formula of pleasure as the source of action without indulging in a looseness of expression unwarranted by scientific accuracy; for here we have a universal law meeting the prescribed requirements based upon facts, and found upon verification to contain nothing not in its concrete as shown in social growth; and demanding for more perfect adaptation but the abolition of artificial restrictions, whereby there may be free scope to "the survival of the fittest."

Notwithstanding such eminent Utilitarians as Hume, Bentham, Mill, and Bain agree that "morality is determined to make sentiment" (Hume); where "proof is impossible as it is needless" (Bentham); as "no reason can be given why the external happiness is desirable beyond the fact that each one desires his own happiness" (Mill); because "it is an ultimate and final assumption" (Bain);—we may confidently deny its scientific accuracy. If *sentiment* be the basis, whence the sentiment and the reasons for its varied expression? In finding the genesis of sentiment and

sympathy as concomitant phenomena in the evolution of life we discover their natural basis. The Hedonist theory of action resembles a Bridgewater Treatise on the adaptation of the eye to sight, both ignoring evolutional antecedents; the ghost of a "moral sense" figuring in the one, as "design" does in the other. Neither Hobbes nor Paley are teachers to-day.

Ethics is not a mere collection of empirical facts, but a science correlated with other sciences and like them genetically based in physical nature, an abstracted phase of general evolution whose concretes present a twofold aspect, and which finds its place in social physics, having both static and dynamic expression. While wider extension is ever given to "the empire of the dead" in shaping the present, it is only in the sense that "the child is the parent of the man," and does not consist in *instituting* infantile conditions into permanent status. Only in thus finding the basis of morals in physical nature does life in all its fulness truly "consist in a correspondence between outer and inner sequences" by social rather than "a pre-established harmony"; and the future course of evolution becomes irradiated with the conscious light of an ultimate sin, and the "conscious pain" of unrealised desires and aspirations seem to have their rounded end not "in sleep," but in "subjective morality"—the perfection of the race. Thus the long-sought reconciliation between science and religion becomes complete, and the universe of sense and feeling is seen to be an ideal unity. Then we will have solved for us Cervantes's Quixotic paradox:

> "I have heard it preached," quoth Sancho, "that God is to be loved with this kind of love for Himself alone, without our being moved to it by hope of reward or fear of punishment; though for my part I am inclined to love and serve Him for what He is able to do for me." 'The devil take thee for a bumpkin,' said Don Quixote, 'thou sayest ever and anon such apt things that one would almost take thee for a scholar.' 'And yet, by my faith,' quoth Sancho, 'I cannot so much as read."

Kant sought a law purely formal, "an *a priori* principle of the will" without material, or experimental content, but the limitations of thought rendered this impossible. But his law, "Act according to that maxim which you would wish, at the same time, to be a

universal law;" or, "Act as if the maxim of thy action were to become by thy will a universal law,"—ceases to be formal inasmuch as it prescribes *something* as matter, or content, of thought, but it fails to show *why* it should be universal. But in the law of equal freedom we have such a generalisation, though arrived at empirically, which, if it does not contain what we *ought to do*, reveals to reason what we ought *to be*, so far as the limited freedom of Self gives scope to will. We may, therefore, regard this as an innate, an *a priori* principle contained in the very essence of personality. Kant's law, to have an intuitive basis, must be founded on egoistic desires, yet discernible by intelligence to accord with race-maintaining conduct. Personality is primary, social relations secondary, and therefore can never suppress the former, though it may, and does, modify the egoistic impulses to altruistic, or remote, ends, but in so doing leads to higher personality.

One out of the many verifications of this fundamental rule of conduct and underlying transient feelings of pleasure, expediency, or intuitive sanction, may be seen in the unconscious development of the sympathetic feelings proceeding *pari passu* with the evolution of greater freedom. Refer to the execution of Ravaillac for the assassination of Henry IV., in 1610. It was a gala day for Paris. Both the desires for pleasure and expediency were surfeited with happiness. From by-street and alley the countless multitude thronged, eager to feast their eyes on the writhing of the tortured victim. In the centre of the public square stood the scaffold. From every window overlooking the scene ladies of high rank competed with the ardor of an opening night at the Royal Opera. The prisoner is bound to the wheel, and every limb separately broken. Then, stretched upon the scaffold, his regicidal hand is cut off, his stomach ripped open, and his entrails burned before his eyes. Still living, faintly gasping under this accumulation of torture, four strong horses are attached to his quivering and broken limbs, and by aid of whips and prods they succeed in dismembering the body in which the spark of life had lingered to the last, his final, despairing cry of agony being greeted with the enthusiastic plaudits of the populace and the waving of perfumed lace-handkerchiefs from the

windows. Since, then, by the same general law by which "all things strive to ascend, and ascend in their striving," social progress has been marked in recognition of greater freedom, not through, but in spite of, the schemes of our social thinkers and moral regulators, and with it we find a development of the sympathetic nature which would cause the most depraved man or woman in our greatest cities to turn pale with horror to-day at such a sight.

In the view here maintained as the basis of moral actions we are presented, moreover, with an ideal for the future, as well as a criterion for past and present, affording a Moral Type under which all social relations become tinged with an ethical character, forecasting an ultimate end ever rising in clearer vision, in more effulgent glory as the recognition of the law of equal freedom is applied to every relation of life, whether religious, political, economic, or social. With a clear understanding of the limitations of personality, and that our much vaunted ego is but a bundle of social instincts and organic aptitudes, we may say in brief, morality knows no higher rule of conduct than this: *Within the lines of equal freedom—be thyself!*

More need not be said save emphasising the lesson. There are vistas opening of social perfection more far-reaching in ethical scope and beauty than prophet's vision ever saw or poet's lyre hymned. It affords us a guide by which we are enabled to see why coercive interference by means of sumptuary enactments work as great havoc with moral evolution as past interference with scientific research did with intellectual growth. In co-ordinating both, it presents an ideal whereby the purely egoistic impulses of our animal natures are subdued to social ends,—an Ideal furnishing alike the incentive and criterion of actions by which the greatest good to each and all may be realised on earth; an Ideal presenting to vision an ever increasing "glory of the human," transcending all myths and schemes of social thinkers, "when men shall beat their swords into ploughshares and their spears into pruning hooks, and learn war no more;" an Ideal under which Equal Freedom is ever seen from age to age to be of wider circumference and personal bearing. And in its conscious application the aristocratic claims of

priestly, political, and economic lords will slink back into the shadows unable to face the bright glare of the noonday sun of Reason shining on an emancipated people living in the mutual bonds of peace and fraternity following the normal evolution of sympathetic natures unchecked by artificial interference and held by reasoned judgment within the broad scope afforded by the *Law of Equal Freedom!*

DYER D. LUM.

LAU-TSZE'S TAU-TEH-KING.[1]

THE OLD PHILOSOPHER'S CLASSIC ON REASON AND VIRTUE TRANSLATED.

I.

1. REASON'S REALISATION.

THE REASON[2] that can be reasoned is not the eternal Reason. The name that can be named is not the eternal name. The nameless is of heaven and earth the beginning. The name-deter-

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[1] The present translation is as literal as a clear rendering of the sense will permit. But it is to be feared that to those who know little or nothing of Chinese philosophy in general and Lau-Tsze in particular, a perusal of his book on Reason and Virtue will prove disappointing on account of its paradoxical style and apparent lack of connexion. But they may rest sure that if they will endeavor to comprehend the significance of its underlying ideas, which after all are very simple, their efforts will be richly rewarded, and we must bear in mind, when forming an opinion on Lau-Tsze, that he was born 604 B. C.

Lau-Tsze frequently introduces quotations many of which (e. g., Chapter 22) are apparently old. Some are wise saws or homely proverbs, while others may be Lau-Tsze's own poetry.

While the division of the Tau-Teh-King into two parts was, according to Sse-Ma-Ts'ien, made by Lau-Tsze himself, the division into chapters and their headings have been made by the commentators. The latter are not always appropriate but have been preserved not only from respect of tradition, but also because references to the Tau-Teh-King are commonly made to the traditional chapter divisions. The pronoun "its" which frequently appears in the chapter headings refers to Tau, the Reason.

For an exposition of Lau-Tsze's philosophy see *The Open Court*, Nos. 483-485.

[2] The word "Reason" has been capitalised wherever it translates the word *tau*, which, reminding us very strongly of the Greek term λόγος, means "word, path, method, and reason."

mined becomes of the ten thousand things[1] the mother. Therefore it is said:

"He who desireless is found
The spiritual of the world will sound.
But he who by desire is bound
Sees the mere shell of things around."

These two things are the same in source but different in name. Their sameness is called a mystery. Indeed, it is the mystery of mysteries. Of all spirituality it is the door.

2. SELF-CULTURE.[2]

When in the world all understand beauty to be beauty, then only ugliness appears. When all understand goodness to be goodness then only badness appears. For

"To be and not to be are mutually conditioned
The difficult, the easy, are mutually definitioned.
The long, the short, are mutually exhibitioned.
Above, below, are mutually cognitioned.
The sound, the voice are mutually coalitioned.
Before and after are mutually positioned."

Therefore, the holy man abides by non-assertion in his affairs and conveys by silence his instruction. When the ten thousand things arise, verily, he refuses them not. He quickens but owns not. He works but claims not. Merit he accomplishes, but he does not dwell on it.

"Since he does not dwell on it,
It will never leave him."

3. KEEPING THE PEOPLE QUIET.

Not exalting worth keeps people from rivalry. Not prizing what is difficult to obtain keeps people from committing theft. Not contemplating what kindles desire keeps the heart unconfused. Therefore, the holy man when he governs empties the people's

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[1] "The ten thousand (viz., all) things" is a name for the world in the sense of nature, or concrete reality.

[2] A better heading of this chapter would be "The Relative and the Absolute.

hearts but fills their souls.[1] He weakens their ambitions but strengthens their backbones.[2] Always he keeps the people unsophisticated and without desire. He causes that the crafty do not dare to act. When he acts with non-assertion[3] there is nothing ungoverned.

4. SOURCELESS.

Reason is empty but its use is inexhaustible. In its profundity, verily, it resembleth the father of the ten thousand things.

"It blunts its own sharpness,
Unfolds its own tangles,
It dims its own light,
It becomes one with its dust."[4]

Oh, how calm it seems to remain! I know not whose son it is. Before the Lord, Reason takes precedence.

5. THE FUNCTION OF EMPTINESS.

Heaven and earth exhibit no benevolence; to them the ten thousand things are like straw dogs.[5] The holy man exhibits no benevolence; to him the hundred families are like straw dogs.

Is not the space between Heaven and earth like unto a bellows? It is empty; yet it collapses not. It moves, and more and more comes forth.

"How soon exhausted is
A gossip's idle talk!
And should we not prefer
On the middle path to walk?"[6]

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[1] Literally "stomachs." *Sin*, "the heart," is conceived as the seat of desire while *fuh*, "the stomach, the interior, or the soul," is the seat of the mind.

[2] Literally "bones."

[3] For *wû wéi*, literally "non-action," meaning non-interference with the natural course of things, see *The Open Court*, No. 484. How much Lau-Tsze insists on resolute activity appears from Chapter 30 and other passages in which "*wû wéi*, or non-action, i. e., non-assertion" is enjoined as a principle of action by which everything can be accomplished? (Chapters 3, 37, 48).

[4] This quotation is repeated in Chapter 56.

[5] Straw dogs are supposed to have been made for sacrificial purposes.

[6] The empty space between heaven and earth does not collapse, but abundance of words in gossiping leads to exhaustion.

6. THE COMPLETION OF FORM.

"The valley spirit not expires
Mysterious mother 'tis called by the sires
The mysterious mother's door, to boot,
Is called of Heaven and earth the root.
Forever and aye it seems to endure
And its use is without effort, sure."[1]

7. DIMMING ITS RADIANCE.

Heaven endures and earth is lasting. And why can Heaven and earth endure and be lasting? Because they do not live for themselves. On that account can they endure.

Therefore the holy man puts his person behind and his person comes to the front. He surrenders his person and his person is preserved. Is it not because he seeks not his own? For that reason he can accomplish his own.

8. THE NATURE OF ITS CHANGES.

Superior goodness resembleth water. The water's goodness benefits the ten thousand things, yet it quarreleth not. Because it dwells in places which the multitude of men shun, therefore it is near unto the eternal Reason.

For a dwelling goodness chooses the level. For a heart goodness chooses commotion. When giving, goodness chooses benevolence. In words, goodness chooses faith. In government goodness chooses order. In business goodness chooses ability. In its motion goodness chooses timeliness. It quarreleth not. Therefore, it is not rebuked.

9. PRACTISING PLACIDITY.

Holding and keeping full, had that not better be left alone? Handling and keeping sharp, can that wear long? If gold and jewels fill the hall no one can protect it.

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[1] This curious quotation may have reference to the worship of some local deity presiding over a spring that never runs dry. The quaint lines gain a peculiar significance by being referred to the Tau as the mysterious mother of the world.

Rich and high but proud, brings about its own misfortune. To accomplish merit and acquire fame, then to withdraw oneself, that is Heaven's Way (viz., Tau).

10. WHAT CAN BE DONE.

He who sustains and disciplines his soul and embraces unity cannot be deranged. Through attention to his vitality and inducing tenderness he can become like a little child. By purifying, by cleansing and profound intuition he can be free from faults.

In loving the people and administering the country he can practise non-assertion. Opening and closing the gates of Heaven he can be like a mother-bird: bright, and white, and penetrating the four quarters, he can be unsophisticated. He quickens them and feeds them. He quickens but owns not. He acts but claims not. He excels but rules not. This is called profound virtue.

11. THE FUNCTION OF THE NON-EXISTENT.

Thirty spokes unite in one nave and on that which is non-existent[1] depends the carriage's utility. Clay is moulded into a vessel and on that which is non-existent depends the vessel's utility. By cutting out doors and windows we build a house and on that which is non-existent depends the house's utility.

Therefore, the existence of things offers opportunities, but that which is non-existent in them renders them useful.

12. ABSTAINING FROM DESIRE.

"The five colors the human eye will blind,
The five notes the human ear will rend.
The five tastes the human mouth offend
Racing and hunting will human hearts turn mad,
Objects of prize make human conduct bad."

Therefore the holy man attends to the inner and not to the outer. He abandons the latter and chooses the former.

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[1] Viz., the hole in the nave, the hollowness of the vessel, the empty space of windows and doors.

13. LOATHING SHAME.

"Favor and disgrace bode awe.

Esteeming the body bodes great trouble."

What is meant by "favor and disgrace bode awe"?

Favor humiliates. Its gain bodes awe; its loss bodes awe. This is meant by "favor and disgrace bode awe."

What is meant by "Esteeming the body bodes great trouble"?

I have trouble because I have a body. When I have no body, what trouble remains?

Therefore, if one administers the empire as he cares for his body, he can be entrusted with the empire. [If he with love as he cares for his body administers the empire, he can be entrusted with the empire.[1]

14. PRAISING THE MYSTERIOUS.

We look at Reason and do not see it; its name is colorless. We listen to Reason and do not hear it; its name is soundless. We grope for Reason and do not grasp it; its name is bodiless.[2]

These three things cannot further be analysed. Thus they are combined and conceived as a unity whose surface is not clear and whose depth is not obscure.[3]

Forever and aye Reason remains unnamable, and again and again it reduces things to non-existence. This is called the form of the formless, the image of the imageless. This is called transcendentally abstruse.

In front its beginning is not seen. In the rear its end is not seen.

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[1] It is probable that this repetition which is contained in all the oldest manuscripts crept into the text through the mistake of an ancient copyist.

[2] The three words *i* (colorless, placid), *hi* (soundless, rare, thin), and *wêi* (minute, fading away, incorporeal) have given rise to much comment, because Abel Rémusat believed to discover in them the name Jehovah. See his Memoir *Sur la vie et les opinions de Lao-Ts'eu*, and compare Stanislaus Julien's Introduction to his translation of the *Tau-Teh-King*, pp. ii–viii.

[3] Viz., it is to a superficial enquirer incomprehensible, but to one who enters deeply into it, quite simple.

By holding fast to the Reason of the ancients, the present is mastered and the origin of the past understood. This is called Reason's clue.

15. THE REVEALERS OF VIRTUE.

Those of yore who have succeeded in becoming masters are subtile, spiritual, profound, and penetrating. On account of their profundity they cannot be understood. Because they cannot be understood, therefore I endeavor to make them intelligible.

How they are cautious! Like men in winter crossing a river. How reluctant! Like men fearing in the four quarters their neighbors. How reserved! They behave like guests. How elusive! They resemble ice when melting. How simple! They resemble unseasoned wood. How empty! They resemble the valley. How obscure! They resemble troubled waters.

Who by quieting can gradually render muddy waters clear? Who by stirring can gradually quicken the still?

He who keeps this Reason is not anxious to be filled. Since he is not filled, therefore he can grow old and need not be newly fashioned.

16. RETURNING TO THE ROOT.

He who arrives at vacuity's summit, guards his tranquillity firmly.

All the ten thousand things arise, and I see them return. Now they bloom in bloom, but each one homeward returneth to its root.

Returning to the root means rest. It signifies the return according to destiny. Return according to destiny means the eternal. Knowing the eternal means enlightenment. Not knowing the eternal causes passions to rise; and that is evil.

Knowing the eternal renders comprehensive. Comprehensive means broad. Broad means royal. Royal means heavenly. Heavenly means Reason. Reason means lasting. Thus the decay of the body implies no danger.

17. SIMPLICITY IN HABITS.

Where great sages are (in power), the subjects do not notice their existence. Where there are lesser sages, the people are at-

tached to them; they praise them. Where still lesser ones are, the people fear them; and where still lesser ones are, the people despise them. For it is said:

"If your faith be insufficient, verily, you will receive no faith.'

How reluctantly sages consider their words! Merit they accomplish; deeds they perform; and the hundred families think: "We are independent; we are free."

18. THE PALLIATION OF VULGARITY.

When the great Reason is obliterated, we have benevolence and justice. Prudence and circumspection appear, and we have much hypocrisy. When family relations no longer harmonise, we have filial piety and paternal love. When the country and the clans decay through disorder, we have loyalty and allegiance.

19. RETURNING TO SIMPLICITY.

Abandon your saintliness; put away your prudence; and the people will gain a hundred-fold!

Abandon your benevolence; put away your justice; and the people will return to filial devotion and paternal love!

Abandon your scheming; put away your gains; and thieves and robbers will no longer exist.

These are the three things in comparison to which we deem culture insufficient. Therefore it is said:

"Hold fast to that which will endure
Show thyself simple, preserve thee pure,
Thy own keep small, thy desires poor."

20. DIFFERENT FROM THE VULGAR.

Abandon learnedness and you have no vexation. The "yes" compared with the "yea," how little do they differ! But the good compared with the bad, how much do they differ!

What the people dread cannot be dreadless. How great is their desolation. Alas! it has not yet reached its limit.

The multitude of men are happy, so happy, as though celebrating a great feast. They are as though in springtime ascending

a tower. I alone remain quiet, alas! like one that has not yet received an encouraging omen. I am like unto a babe that does not yet smile.

Forlorn am I, O, so forlorn! It appears that I have no place whither I may return home.

The multitude of men all have plenty and I alone appear empty. Alas! I am a man whose heart is foolish.

Ignorant am I, O, so ignorant! Common people are bright, so bright, I alone am dull.

Common people are smart, so smart, I alone am confused, so confused.

Desolate am I, alas! like the sea. Adrift, alas! like one who has no place where to stay.

The multitude of men all possess usefulness. I alone am awkward and a rustic too. I alone differ from others, but I prize seeking sustenance from our mother.

21. EMPTYING THE HEART.

"Vast virtue's form
Follows Reason's norm.
And Reason's nature
Is vague and eluding.
How eluding and vague
All types including.
How vague and eluding!
All beings including.
How deep, and how obscure.
It harbors the spirit pure,
Whose truth is ever sure,
Whose faith abides for aye
From of yore until to-day.
Its name is without cessation.
It watches the world's formation."

Whereby do I know that it watches the world's formation? By this same Reason!

22. HUMILITY'S INCREASE.

"The deficient will recuperate.
And the crooked shall be straight.
The empty find their fill.
The worn with strength will thrill.
Who have little shall receive.
Who have much will have to grieve."

Therefore the holy man embraces unity and becomes for all the world a model. He is not self-displaying, and thus he shines. He is not self-approving, and thus he is distinguished. He is not self-praising, and thus he acquires merit. He is not self-glorifying, and thus he excels. Since he does not quarrel, therefore no one in the world can quarrel with him.

That saying of the ancients: "The deficient will recuperate," is it in any way vainly spoken? Verily, they will recuperate, but they must return home.

23. EMPTINESS AND NON-EXISTENCE.

To be taciturn is the natural way.

A hurricane does not outlast the morning. A cloudburst does not outlast the day. Who causes these events but Heaven and Earth? If even Heaven and Earth cannot be unremitting, will not man be much less so?

Therefore one who pursues his business with Reason, the man of Reason, is identified with Reason. The man who pursues his business with virtue is identified with virtue. The man who pursues his business with loss is identified with loss. When identified with Reason, he forsooth joyfully embraces Reason; when identified with virtue, he forsooth joyfully embraces virtue; and when identified with loss, he forsooth joyfully embraces loss.

"He whose faith is insufficient shall not find faith."

24. TROUBLES IN (THE EAGERNESS TO ACQUIRE) MERIT.

A man on tiptoe cannot stand. A man astride cannot walk. A self-displaying man cannot shine. A self-approving man cannot

be distinguished. A self-praising man cannot acquire merit. A self-glorying man cannot excel. Before the tribunal of Reason he is like offal of food and like an excrescence in the system which all people are likely to detest. Therefore, one who has Reason is without attachment.

25. IMAGING THE MYSTERIOUS.

There is Being that is all-containing, which precedes the existence of Heaven and earth. How calm it is! How incorporeal! Alone it stands and does not change. Everywhere it goes without reaching limits, and can on that account become the world's mother. I know not its name. Its character is defined as Reason. When obliged to give it a name, I call it the Great. The Great I call the Evasive. The Evasive I call the Distant. The Distant I call the Returning.

The saying goes: Reason is great, Heaven is great, Earth is great, and Royalty also is great. There are four things in the world that are great, and Royalty is one of them.

Man's standard is the Earth. The Earth's standard is Heaven. Heaven's standard is Reason. Reason's standard is the intrinsic.

26. THE VIRTUE OF DIGNITY.

The heavy is of the light the root, and rest is motion's master.

Therefore the holy man in his daily walk does not depart from the baggage train.[1] Although he may have magnificent sights, he calmly sits with liberated mind.

But how is it with the master of the ten thousand chariots? In his personal conduct he makes light of the empire. He makes light of it and will lose his vassals. He is passionate and will lose the throne.

27. THE FUNCTION OF SKILL.

"Good travellers leave not trace nor track,
Good speakers, in logic show no lack,
Good counters need no counting rack.

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[1] "Not to depart from the baggage waggons" has become proverbial in Chinese and means "to preserve one's dignity."

Good lockers bolting bars need not,
Yet none their locks can loose.
Good binders need not string nor knot,
Yet none unties their noose."

Therefore the holy man is always a good saviour of men, for there are no outcast people. He is always a good saviour of things, for there are no outcast things. This is called concealed enlightenment.

Therefore the good man is the bad man's instructor, while the bad man is the good man's capital. He who does not esteem his instructor, and he who does not love his capital, although he may be prudent, is greatly mistaken. This I call significant spirituality.

28. RETURNING TO SIMPLICITY.

"Who his manhood shows
And his womanhood knows[1]
Becomes the empire's river.
Is he the empire's river,
He will from virtue never deviate,
And home he turneth to a child's estate.

"Who his brightness shows
And his blackness knows
Becomes the empire's model.
Is he the empire's model,
Of virtue never he'll be destitute,
And home he turneth to the absolute.

"Who knows his fame
And guards his shame
Becomes the empire's valley.
Is he the empire's valley,
For e'er his virtue will sufficient be,
And home he turneth to simplicity."

[1] Manhood represents strength, and womanhood weakness.

By scattering about his simplicity he makes (of the people) vessels of usefulness. The holy man employs them as officers; for a great administration does no harm.

29. NON-ASSERTION.

When one desires to take in hand the empire and make it, I see him not succeed. The empire is a divine vessel which cannot be made. One who makes it, mars it. One who takes it, loses it. And it is said of beings:

"Some are obsequious, others move boldly,
Some breathe warmly, others coldly,
Some are strong and others weak,
Some rise proudly, others sneak."

Therefore the holy man abandons pleasure, he abandons extravagance, he abandons indulgence.

30. BEWARE OF WAR.

He who with Reason assists the master of mankind will not with arms conquer the empire. His methods are such as invite requital.

Where armies are quartered briars and thorns grow. Great wars unfailingly are followed by famines. A good man acts resolutely and then stops. He ventures not to take by force. He is resolute but not boastful; resolute but not arrogant; resolute because he cannot avoid it: resolute but not violent.

Things thrive and then grow old. This is called un-Reason. Un-Reason soon ceases.

31. QUELLING WAR.

Even beautiful arms are unbiest among tools, and people had better shun them. Therefore he who has Reason does not employ them.

The superior man when residing at home honors the left. When using arms, he honors the right. Arms are unbiest among tools and not the superior man's tools. Only when it is unavoidable he uses them. Peace and quietude he holds high. He con-

quers but rejoices not. Rejoicing at a conquest means to enjoy the slaughter of men. He who enjoys the slaughter of men will most assuredly not obtain his will in the empire.

[In propitious events the left is exalted. In evil events the right is exalted. The assistant army-leader sits to the left. The superior army-leader sits to the right. This indicates that the position of superior power is here as in the arrangement of funeral ceremonies. The slaughter of many multitudes of men must be deplored with sorrow and lamentation, and the conqueror in a battle must be placed according to the funeral ceremonial.][1]

32. THE VIRTUE OF HOLINESS.

Reason is always ineffable. Although its simplicity seems insignificant, the whole world does not dare to suppress it. If princes and kings could keep it, the ten thousand things would of themselves pay homage. Heaven and Earth would unite in dropping sweet dew, and the people with no one to command them would of themselves be righteous.

With the beginning of cosmic order Reason became name-determined. Whenever the name-determined in its turn acquires existence, one learns to know when to stop. By knowing when to stop, one avoids danger.

To illustrate Reason's relation to the world we compare it to streamlets and creeks in their course towards great rivers and the ocean.

33. THE VIRTUE OF DISCRIMINATION.

One who knows others is clever, but one who knows himself is enlightened.

One who conquers others is powerful, but one who conquers himself is mighty.

One who knows sufficiency is rich.

One who pushes with vigor has will, one who loses not his place endures. One who may die but will not perish, is endowed with life for ever.

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[1] This passage is supposed to be written by Wang Pi as a comment and has crept into the text by mistake.

34. TRUST IN ITS PERFECTION.

How all-pervading is the great Reason! It can be on the left and it can be on the right. The ten thousand things depend upon it for their life, and it refuses them not. When its merit is accomplished it assumes not the name. Lovingly it nourishes the ten thousand things and plays not the lord. Ever desireless it can be classed with the small. The ten thousand things return home to it. It plays not the lord. It can be classed with the great.

Therefore, the holy man unto death does not make himself great and can thus accomplish his greatness.

35. THE VIRTUE OF BENEVOLENCE.

"Who holdeth fast to the great Form,
Of him the world will come in quest:
For there they never meet with harm,
But find contentment, comfort, rest."

Music with dainties makes the passing stranger stop.[1]

When Reason comes from the mouth, how tasteless it is! It has no flavor. When looked at, there is not enough to be seen; when listened to, there is not enough to be heard, but its use is inexhaustible.

36. SECRET ENLIGHTENMENT.

That which is about to contract has surely been first expanded. That which is about to weaken has surely been first strengthened. That which is about to fall has surely been first raised. That which is about to be despoiled has surely originally been endowed.

This is called secret enlightenment.

The tender and the weak conquer the hard and the strong.

As the fish should not escape from the deep, so the country's sharp tools should not be shown to the people.

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[1] The connexion of this sentence with the following paragraph is the thought that music and dainties are to the taste of the people, but Reason is useful.

37. ADMINISTRATION OF GOVERNMENT.

Reason always practises non-assertion, and there is nothing that remains undone.

If princes and kings could keep Reason, the ten thousand things would of themselves be reformed. While being reformed they would yet be anxious to stir; but I would restrain them by the simplicity of the nameless.

"The simplicity of the unexpressed
Will purify the heart of lust.
Where there's no lust there will be rest,
And all the world will thus be blest."

II.

38. DISCOURSING ON VIRTUE.

Superior virtue in un-virtue. Therefore, it has virtue. Inferior virtue never loses sight of virtue. Therefore it has no virtue. Superior virtue is non-assertion and without pretension. Inferior virtue asserts virtue and makes pretensions.

Superior benevolence acts but makes no pretensions.

Superior justice acts and makes pretensions. The superior propriety acts and when no one responds to it, it stretches its arm and enforces its rules. Thus it loses Reason and then virtue appears. It loses virtue and then benevolence appears. It loses benevolence and then justice appears. It loses justice and then propriety appears. The rules of propriety are the semblance of loyalty and faith, and the beginning of disorder.

Quick-wittedness is the (mere) flower of Reason, but of ignorance the beginning.

Therefore a great man abides by the solid and dwells not in the external. He abides in the fruit and dwells not in the flower. Therefore he discards the latter and chooses the former.

39. THE ROOT OF ORDER.

From of old these things have obtained oneness:

"Heaven through oneness has become pure.
Earth through oneness can endure.

Minds through oneness their souls procure.
Valleys through oneness repletion secure.

"All creatures through oneness to life have been called.
And kings were through oneness as models installed."

Such is the result of oneness.

"Were Heaven not pure it might be rent.
Were earth not stable it might be bent.
Were minds not ensouled they'd be impotent.
Were valleys not filled they'd soon be spent.
When creatures are lifeless who can their death prevent?
Are kings not models, but on highness bent,
Their fall, forsooth, is imminent."

Thus, the noble come from the commoners as their root, and the high rest upon the lowly as their foundation. Therefore, princes and kings call themselves orphans, widowers, and unworthies. Is this not because they take lowliness as their root?

The several parts of a carriage are not a carriage.[1]

Those who have become a unity are neither anxious to be praised with praise like a gem, nor disdained with disdain like a stone.

40. AVOIDING ACTIVITY.

"Homeward is Reason's course,
Weakness is Reason's force."

Heaven and earth and the ten thousand things come from existence, but existence comes from non-existence.

41. SAMENESS IN DIFFERENCE.

When a superior scholar hears of Reason he endeavors to practise it. When an average scholar hears of Reason he will sometimes keep it and sometimes lose it. When an inferior scholar hears of reason he will greatly ridicule it. Were it not thus ridiculed, it would as Reason be insufficient. Therefore the poet says:

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[1] The simile of the unity of a chariot as being, like the unity of a soul, not any one of its parts, is used also in the *The Milinda Pañha*, one of the most important books of the Buddhist canon.

"The reason-enlightened seem dark and black,
The reason-advanced seem going back,
The reason-straight-levelled seem rugged and slack.

"The high in virtue resemble a vale,
The purely white in shame must quail,
The broadest virtue seems to fail.

"The solidest virtue seems not alert,
The simplest truth appears pervert,
The greatest square will rightness desert.

"The largest vessel is not yet complete,
The loudest sound is not speech replete,
The greatest form has no shape concrete."

Reason is hidden and has no name. Yet Reason alone is good for imparting and completing.

42. REASON'S MODIFICATIONS.

Reason begets unity; unity begets duality; duality begets trinity; and trinity begets the ten thousand things.

The ten thousand things bear the negative principle and embrace the positive principle, while the immaterial breath renders them harmonious.

That which the people find odious, to be an orphan, a widower, or to be unworthy, kings and princes select as their titles. Thus seeming loss is but gain. Seeming gain is but loss.

What others have taught I teach also. The strong and aggressive do not die a natural death; but I shall expound the doctrine's foundation.

43. ITS UNIVERSAL APPLICATION.

The world's weakest overcomes the world's hardest. Non-existence enters into the impenetrable. Thereby I comprehend of non-assertion the advantage, and of silence the lesson. There are few in the world who obtain the advantage of non-assertion.

44. SETTING UP PRECEPTS.

"Name or person, which is more near?
Person or fortune, which is more dear?
Gain or loss, which is more sear?

"Extreme dotage leadeth to squandering,
Hoarded wealth inviteth plundering.

"Who is content incurs no humiliation,
Who knows when to stop risks no vitiation,
Forever lasteth his duration."

45. GREATEST VIRTUE.

"The greatest perfection seems imperfect,
But its work undecaying remaineth.
The greatest fulness is emptiness-checked,
But its work 's not exhausted nor waneth."

Thus, the greatest straightness resembleth crookedness. The greatest mastery resembleth apprenticeship. The greatest eloquence resembleth stammering.

Motion conquers cold. Quietude conquers heat. Clearness and purity are the world's standard.

46. MODERATION OF DESIRE.

When the world possesses Reason, race horses are reserved for hauling dung. When the world is without Reason, war horses are bread in the common.

No greater sin than yielding to desire. No greater misery than discontent. No greater calamity than acquisitiveness.

Therefore, he who knows the contentment of content is always content.

47. VIEWING THE DISTANT.

"Without passing out of the gate
The world's course I prognosticate.
Without peeping through the window,

The heavenly Reason I contemplate.
The further one goes,
The less one knows."

Therefore, the sage does not travel, and yet he has knowledge. He does not see the things, and yet he defines them. He does not labor, and yet he completes.

48. FORGETTING KNOWLEDGE.

He who seeks learnedness will daily increase. He who seeks Reason will daily diminish. He will diminish and continue to diminish until he arrives at non-assertion. With non-assertion there is nothing that he cannot achieve. When he takes the empire, it is always because he uses no diplomacy. He who uses diplomacy, is not fit to take the empire.

49. TRUST IN VIRTUE.

The sage never possesses his heart. The hundred families' hearts he makes his heart.

The good I meet with goodness; the bad I also meet with goodness; for virtue is good. The faithful I meet with faith; the faithless I also meet with faith; for virtue is faithful.

The sage dwells in the world anxious, very anxious in his dealings with the world. He universalises his heart and the hundred families fix upon him their ears and eyes. The sage is as a child among them all.

50. THE ESTIMATION OF LIFE.

Going forth is life; coming home is death.

Three in ten are pursuers of life; three in ten are pursuers of death; three in ten of the men that live pass into the realm of death.[1]

Now, what is the reason? It is because they live life's intensity.

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[1] We interpret this passage to mean that nine in ten spoil their lives; three because bent on life for life's sake, three ruining themselves, and three actually dying. There is only one in ten who esteems life in the right way.

Why! I understand that one who takes good care of his life, when travelling on land will not fall in with the rhinoceros or the tiger. When entering an army he need not fear armed soldiers. The rhinoceros finds no place where to insert its horn. The tiger finds no place where to lay his claws. The soldier finds no place where to thrust his blade. The reason is that he does not belong to the realm of death.

51. NURSING VIRTUE.

Reason quickens all creatures. Virtue feeds them. Reality shapes them. The forces complete them. Therefore among the ten thousand things there is none that does not esteem Reason and honor virtue.

Since the esteem of Reason and the honoring of virtue is by no one commanded, it is forever spontaneous. Therefore it is said that Reason quickens all creatures, while virtue feeds them, raises them, nurtures them, completes them, matures them, rears them, and protects them.

To quicken but not to own, to make but not to claim, to raise but not to rule, this is called profound virtue.

52. RETURNING TO THE ORIGIN.

When the world takes its beginning, Reason becomes the world's mother.

When he who knows his mother, knows in turn that he is her child, and when he who is quickened as a child, in turn keeps to his mother, to the end of life, his person is not in danger. When he closes his mouth, and shuts his sense-gates, in the end of life, his person affords no trouble; but when he opens his mouth and meddles with affairs, in the end of life his person cannot be saved.

Who beholds his smallness is called enlightened. Who preserves his tenderness is called strong. Who uses Reason's light and returns home to its enlightenment does not surrender his person to perdition. This is called practising the eternal.

53. GAINING INSIGHT.

If I have too little knowledge of walking in the great Reason, I have merely to be afraid of self-assertion.

The great Reason is very plain, but people are fond of by-paths.

When a palace is very splendid, the fields are very weedy and granaries very empty.

To wear ornaments and gay clothes, to carry sharp swords, to be excessive in drinking and eating, to have a redundance of costly articles, this is the pride of robbers. Surely this is un-Reason!

54. THE CULTIVATION OF INTUITION.

"What is well planted is not uprooted;
What's well preserved cannot be looted!"

By sons and grandsons the sacrificial celebrations shall not cease.

Who cultivates Reason in his person, his virtue is genuine. Who cultivates it in his house, his virtue is overflowing. Who cultivates it in his township, his virtue is lasting. Who cultivates it in his country, his virtue flourishes. Who cultivates it in the world, his virtue is universal.

Therefore, by one's person one tests persons. By one's house one tests houses. By one's township one tests townships. By one's country one tests countries. By one's world one tests worlds.

How do I know that the world is such? Through Reason.

55. THE WARRANT OF THE MYSTERIOUS.

He who possesses virtue in all its solidity is like unto a little child. Venomous reptiles do not sting him, fierce beasts do not seize him. Birds of prey do not strike him. His bones are weak, his sinews tender, but his grasp is firm. He does not yet know the relation between male and female, but his virility is strong. Thus his metal grows to perfection. A whole day he might cry and sob without growing hoarse. This shows the perfection of his harmony.

To know the harmonious is called the eternal. To know the eternal is called enlightenment.

To increase life is called a blessing, and heart-directed vitality is called strength, but things vigorous are about to grow old and I call this un-Reason.

Un-Reason soon ceases!

56. THE VIRTUE OF THE MYSTERIOUS.

One who knows does not talk. One who talks does not know. He keeps his mouth shut and his sense-gates closed.

"He blunts his own sharpness.
Unfolds his own tangles.
He dims his own light.
He identifies himself with his own dust."[1]

This is called profound identification.

Thus he is inaccessible to friendship and also inaccessible to enmity. He is inaccessible to profit and inaccessible to loss. He is also inaccessible to favor and inaccessible to disgrace. Thus he becomes world-honored.

57. SIMPLICITY IN HABITS.

With rectitude one governs the state; with craftiness one leads the army; with non-diplomacy one takes the empire. How do I know that it is so? Through Reason.

The more restrictions and prohibitions are in the empire, the poorer grow the people. The more weapons the people have, the more troubled are the homes of the country. The more there is cunning and skill, the more startling events will happen. The more mandates and laws are enacted, the more there will be thieves and robbers.

Therefore the holy man says: I practise non-assertion, and the people of themselves reform. I love quietude, and the people of themselves become righteous. I use no diplomacy, and the people of themselves become rich. I have no desire, and the people of themselves remain simple.

58. ADAPTATION TO CHANGE.

Whose government is unostentatious, quite unostentatious, his people will be prosperous, quite prosperous. Whose government is prying, quite prying, his people will be needy, quite needy.

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[1] The same quotation as in Chapter 4.

Misery, alas! rests upon happiness. Happiness, alas! underlies misery. But who foresees the catastrophe? It will not be prevented!

When the righteous turn rascals and the good turn evil-doers, it bodes the degeneration of mankind. Its day is already lasting.

Therefore the sage is square but not sharp, strict but not obnoxious, upright but not restraining, bright but not dazzling.

59. HOLD FAST TO REASON.

In governing men and in attending to Heaven, there is nothing like moderation. Now since of moderation it is said that it must be early acquired, if early acquired, it is richly accumulated virtue. If one has richly accumulated virtue, then nothing is unconquerable. If there is nothing unconquerable, then no one knows his limits. If no one knows his limits, one can possess the country. If one possesses the mother of the country (moderation), one can thereby last long. This is called having deep roots and firm fibres; of long life and lasting comprehension this is the way.

60. HOW TO KEEP ONE'S PLACE.

Govern a great country as you would fry small fish.[1]

If with Reason the empire is managed, its ghosts will not spook. Not only will its ghosts not spook, but its gods will not harm men. Not only will its gods not harm men, but its sages will also not harm men. Since neither will do harm, therefore their virtues will be combined.

61. THE VIRTUE OF HUMILITY.

A great state, one that lowly flows, becomes the empire's union, and the empire's wife. The wife always through quietude conquers her husband. As quietude is stooping, thus a great state through stooping to small states takes the small states, and small states, by stooping to great states, will take great states.

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[1] Viz., neither gut nor scale them.

Therefore, some stoop to conquer; others stoop in consequence of conquering.

A great state desires no more than to unite and feed the people; a small state desires no more than to devote itself to the service of the people; but that both may obtain their wishes, the greater one must stoop.

62. PRACTISE REASON.

It is Reason that is the ten thousand things' asylum, the good man's wealth, the bad man's stay.

With beautiful words one can sell. With honest conduct one can do still more.

If a man be bad, why should he be thrown away? Therefore, an emperor was elected and three ministers appointed; but better than holding before one's face the jade table (of the ministry) and riding with four horses, is sitting still and propounding the eternal Reason.

Why do the ancients prize this Reason? Is it not, say, because when sought it is obtained and the sinner thereby can be saved? Therefore it is the world's glory.

63. CONSIDER BEGINNINGS.

Assert non-assertion. Practise non-practice. Taste non-taste. Make great the small. Make much the little.

Respond to hostility with virtue.

Contemplate a difficulty when it is easy. Manage a great thing when it is small.

The world's most difficult undertakings necessarily originate while easy, and the world's greatest undertakings necessarily originate while small.

Therefore the sage to the end does not venture to play the great, and thus he can accomplish his greatness. As one who lightly promises rarely keeps his word, so he to whom many things are easy will necessarily encounter many difficulties. Therefore, the holy man regards everything as difficult, and thus to the end encounters no difficulties.

64. MIND THE INSIGNIFICANT.

What is still at rest is easily kept quiet. What has not as yet appeared is easily prevented. What is still feeble is easily broken. What is still scant is easily dispersed.

Treat things before they exist. Regulate things before disorder begins. The spreading tree originates from a tiny fibre. A tower of nine stories rises from a small mound of earth. A thousand miles' journey begins with a foot.

He that makes mars. He that grasps loses.

The holy man does not make; therefore he mars not. He does not grasp; therefore he loses not. The people when undertaking an enterprise are always near completion, and yet they fail. Remain careful to the end as in the beginning and you will not fail in your enterprise.

Therefore the holy man desires to be desireless, and does not prize articles difficult to obtain. He learns, not to be learned, and tries again what the multitudes of the people give up. He assists the ten thousand things in their natural development, but he does not dare to interfere.

65. THE VIRTUE OF SIMPLICITY.

The ancients who were well versed in Reason did not thereby enlighten the people; they intended thereby to make them simple-hearted.

If people are difficult to govern, it is because they are too smart. To govern the country with smartness is the country's curse. To govern the country without smartness is the country's blessing. He who knows these two things is also a model, like the ancients. Always to know them is called profound virtue.

Profound virtue is deep, forsooth. It is far-reaching, forsooth. It is to everything reverse, forsooth. But then it will procure great obedience.

66. PUTTING ONESELF BEHIND.

That rivers and oceans can of the hundred valleys be kings is due to their excelling in lowliness. Thus they can of the hundred valleys be the kings.

Therefore the sage, when anxious to be above the people, must in his words keep underneath them. When anxious to lead the people, he must with his person keep behind them.

Therefore, the sage dwells above, but the people feel not the burden. He is ahead, but the people suffer no harm. Therefore the world rejoices in exalting him without tiring. Because he strives not, no one in the world will strive with him.

67. THE THREE TREASURES.

All in the world call my Reason greatly abnormal, but it resembles the abnormal only because it is great. Did it resemble the normal, how lasting, indeed, would its mediocrity be!

I have three treasures which I preserve and treasure. The first is called compassion. The second is called economy. The third is called not daring to come in the world to the front. The compassionate can be brave; the economical can be generous; those who dare not come to the front in the world can become complete as chief vessels.

Now, if people discard compassion and are brave; if they discard economy and are generous; if they discard modesty and are ambitious, they will surely die!

Now, the compassionate will in the attack be victorious, and in the defence be firm. Heaven when about to save one will with compassion protect him.

68. COMPLYING WITH HEAVEN.

He who excels as a commander is not warlike. He who excels as a fighter is not wrathful. He who excels in conquering the enemy does not strive. He who excels in employing men is lowly.

This is called the virtue of those who do not strive. This is called utilising men's ability. This is called complying with Heaven —since olden times the highest.

69. THE FUNCTION OF THE MYSTERIOUS.

A military expert has said: "I dare not act as host but act as guest.[1] I dare not advance an inch, but I withdraw a foot."

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[1] Viz., "I am reserved." I allow the enemy to open hostilities. But when hos-

This is called marching without marching, threatening without arms, charging without hostility, seizing without an army.

No greater misfortune than making light of the enemy! When we make light of the enemy, it is almost as though we had lost our treasure—(compassion).

Thus, if matched armies encounter one another, the tenderer one is sure to conquer.

70. DIFFICULT TO UNDERSTAND.

My words are very easy to understand and very easy to practise, but in the world no one can understand, no one can practise them.

Words have an ancestor; Deeds have a master—(Reason). Since he is not understood, therefore I am not understood. Those who understand me are few, and thus I am distinguished.

Therefore the holy man wears wool, and hides in his bosom his jewels.

71. THE DISEASE OF KNOWLEDGE.

To know the unknowable that is elevating. Not to know the knowable that is sickness.

Only by becoming sick of sickness we can be without sickness.

The holy man is not sick, because he is sick of sickness. Therefore he is not sick.

72. HOLDING ONESELF DEAR.

If the people do not fear the dreadful, the great dreadful will come, surely.

Do not render their lives narrow. Do not make their lot weari some. When it is not made wearisome, then it will not be wearisome.

Therefore, the sage knows himself but does not display himself. He holds himself dear but does not honor himself. Thus he discards the latter and chooses the former.

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tilities can no longer be avoided Lau-Tsze proposes to strike resolutely and to end hem. Compare Chapter 30.

73. DARING TO ACT.

Courage, if carried to daring, leads to killing; courage, if not carried to daring, leads to letting live. Either of these two things is sometimes beneficial, sometimes harmful.

"Why 't is by Heaven rejected,
Who has the reason detected?"

Therefore the holy man also regards it as difficult.

The Heavenly Reason strives not, but it is sure to conquer It speaks not, but it is sure to respond. It summons not, but it comes of itself. It works patiently but is sure in its designs.

Heaven's net is vast, so vast. It is wide-meshed, but it loses nothing.

74. OVERCOME DELUSION.

If the people do not fear death, how can they be frightened by death?

If we make people fear death, and supposing some would (still) dare to rebel, if we seize them for capital punishment, who will dare?

There is always an executioner who kills. Now to take the place of the executioner who kills is taking the place of the great carpenter who hews. If a man takes the place of the great carpenter who hews it will be an exception, indeed, if he does not injure his hand.

75. HARMED THROUGH GREED.

The people hunger because their superiors consume too many taxes; therefore they hunger. The people are difficult to govern because their superiors are too meddlesome; therefore it is difficult to govern. The people make light of death on account of the intensity of their clinging to life; therefore they make light of death.

He who is not bent on life is superior to him who esteems life.

76. BEWARE OF STRENGTH.

Man during life is tender and delicate. When he dies he is stiff and stark.

The ten thousand things, the grass as well as the trees, are while they live tender and subtle. When they die they are rigid and dry. Thus the hard and the strong are the companions of death. The tender and the delicate are the companions of life.

Therefore, he who in arms is strong will not conquer. When a tree has grown strong it is doomed.

The strong and the great stay below. The tender and the delicate stay above.

77. HEAVEN'S REASON.

Heaven's Reason verily is like stretching a bow. It brings down the high, it lifts up the lowly. It diminishes those who have abundance; it gives to those who are deficient.

Such is Heaven's Reason. It diminishes those who have abundance but makes complete the deficient.

Man's Reason is not so. He diminishes the deficient in order to serve those who have abundance. Where is he who would have abundance for serving the world? It is the man of Reason.

Therefore the holy man acts but does not claim; merit he accomplishes but is not attached, and indeed he is not anxious to display his excellence.

78. TRUST IN FAITH.

In the world nothing is tenderer and more delicate than water. In attacking the hard and the strong nothing will surpass it. There is nothing that herein takes its place. The weak conquer the strong, the tender conquer the rigid. In the world there is no one who does not know it, but no one will practise it. Therefore the holy man says:

> "Him who the country's sin makes his,
> We hail as priest at the great sacrifice.
> Him who the curse bears of the country's failing
> As king of the empire we are hailing."

True words seem paradoxical.

79. KEEP YOUR OBLIGATIONS.

When a great hatred is reconciled, naturally some hatred wil remain. How can this be made good?

Therefore the sage keeps the obligations of his contract and exacts not from others. Those who have virtue attend to their obligations; those who have no virtue attend to their claims.

Heaven's Reason shows no preference but always assists the good man.

80. REMAINING IN ISOLATION.

In a small country with few people let there be aldermen and mayors who are possessed of power over men but would not use it. Induce people to grieve at death but do not cause them to move to a distance. Although they had ships and carriages they should find no occasion to ride in them. Although they had armors and weapons they should find no occasion to don them.

Induce people to return to knotted cords[1] and to use them, to delight in their food, to be proud of their clothes, to be content with their homes, and to rejoice in their customs: then in a neighboring state within sight, the voices of the cocks and dogs would be within hearing, yet the people might grow old and die before they visited one another.

81. PROPOUNDING THE ESSENTIAL.

True words are not pleasant; pleasant words are not true; good ones are not contentious; contentious ones are not good; instructive ones are not stilted; stilted ones are not instructive.

The holy man hoards not. The more he does for others, the more he owns himself. Therefore by giving to others, he acquires more for himself.

Heaven's Reason is to benefit but not to injure; the holy man's Reason is to act but not to strive.

EDITOR.

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[1] The most ancient method of writing.

LITERARY CORRESPONDENCE.

FRANCE.

M. LOMBROSO publishes, at the same time with the new edition of his *Homme de génie*,[1] the first edition of his *Femme criminelle et la prostituée.* I shall not reproduce here, with regard to the first-mentioned work, the objections which I have already made to certain extravagant features of the theory of the illustrious Professor, but I must reproach him in passing with having placed too much confidence in certain historical witnesses which are open to suspicion (even the legend of Jeanne la Folle, the mother of Charles V., appears groundless) and also with not exercising sufficient criticism. Nothing could be less founded, for example, than the assertion of Mohammed's being diseased. How can M. Lombroso charge the Prophet of the Mussulmans with lack of system in the composition of the holy writings? Does he not know that the verses of the Koran were enounced according as new questions arose which frequently had to be solved differently according to the circumstances or the experience acquired? The Koran is not the book of a man of letters or of a professor.

The whole doctrine should be revised and amended. DR. TOULOUSE has just opened at Paris a series of inquiries which are destined to control the theories of Lombroso. His first publication bears the title *Enquête médico-psychologique, I. Introduction générale. —E. Zola.*[2] This book is certainly well worked out, but its con-

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[1] Georges Carré, publisher. Where the publisher is not mentioned, the books are published by Félix Alcan.

[2] Published by the *Société d'éditions scientifiques.*

clusions give here and there the impression of timidity and vacillation, and on several points M. Lombroso has addressed to Dr. Toulouse justifiable criticisms. Furthermore, I cannot refrain from censuring the speedy publication of such inquiries. It would have been wiser, I think, to have pursued them privately. The data gathered should have been deposited at the Academy of Medicine, and should not have been made use of until several years after the death of the subjects examined. Then, pabulum would not have been afforded to the press along with hazardous deductions whose real significance the common ignorance of journalists cannot appreciate, a larger number of authors would then undoubtedly have taken part in the inquiry, and both science and the families investi gated would have profited by this discretion. The mania for notoriety should not be permitted to corrupt the scientific spirit, nor should the public ever have reason to suspect a desire for pecuniary profit on the part of physicians.

La Femme criminelle et la prostituée, written by Lombroso in collaboration with M. G. FERRERO is less a finished and completely co-ordinated book than a collection of facts to be interpreted, from which the learned authors have already drawn many sound conclusions. The thesis of the work is this, that "prostitution is the feminine side of criminality," that is to say, that in woman moral insanity manifests itself rather in sexual excesses and aberrations than in crime: the rarity of the criminal type having as its corollary in the female sex a less frequency of degenerations and cortical irritation. These results are even justified by the study of the normal woman, and may be explained by the fact that her energy and variability are less, and that she is in reality "intellectually and physically a man arrested in development." The last expression does not appear to me a felicitous one. It would be more exact to say that woman has evolved toward her function just as man has evolved toward his, that she has been differentiated from man by evolution in virtue of the rôle she has had to play, which is that of a mother and a conservator of the species. From this fact alone, which the authors do not neglect to emphasise, but to which they do not always give full prominence, are derived the psychological

characters of the female sex which they have analysed with patience and firmly established, although often running counter to our prejudices.

* * *

M. H. BERGSON, in his *Matière et mémoire, essai sur la relation du corps à l'esprit*, never intended for a moment to advance the study of a psychological phenomenon, but has sought to formulate a doctrine in philosophy. He does not abide by the facts, endeavoring to explain them by the aid of reason and of experience, but he seeks beyond the facts a "virtual" being or entity which has no existence save in his own sportive imagination. Neither his theory of bodies, which are said to be simple "instruments of action,' incapable of preparing or explaining "representation," nor his theory of "pure perception, of "pure memory, and of "stages of consciousness," are presented to the reader with sufficient lucidity, ingenious though they are, and despite the grammatical precision of the author's language. No one, I am afraid, will understand them but himself. The object of his subtle analysis is apparently to reverse the accepted thesis—"memory is a function of the brain and there is nothing but a difference of degree between perception and memory"—and to substitute for it the following: "memory is not a function of the brain but something else, and there is not a difference of degree but a difference of nature between perception and memory," so as to establish by this thesis the existence of *liberty* in some absolutely mysterious region of the ego. But how is this liberty to be understood which "plunges its roots deep into necessity and is organically connected with necessity," these states, so "profound" that one can never reach them, and so "pure" that they vanish before the grasp? How can we be led by such methods to comprehend more clearly the relations of body and mind? How, finally, can inquiries concerning the "intermediary stages between dreams and action" furnish to-day the solution of that ancient and illusive problem?

The peculiar idealism of M. Bergson has found its adversary in the idealism of M. Fouillée. Let us not abandon the solid ground

of experience, or philosophy will soon be nothing more than the science of facts which do not exist.

* * *

M. E. RÉCÉJAC offers in his *Essai sur les fondements de la connaissance mystique* a curious study of what he calls "mystical experience." This has, according to him, a value comparable to the other methods of knowledge. It would even have a higher value if its position in philosophy were really such as M. Récéjac asserts, for then the mystical act, that is to say, "the union of freedom with imagination," would be the only possible expression of the absolute in human consciousness.

What, then, is the mechanism of the mystical act? It consists, according to the author, in producing, under a definite moral influence, analogical representations and symbols, to which reason which never loses its rights, applies itself, in order to render apparent by their means the relations, "sensible to the heart alone,' of our inmost personality with the infinite. The representative action of symbols is thus tantamount to a "moral presence" of the absolute: "it strengthens incomparably the natural powers and intrinsic qualities of the subject." The creations of faith, further, have no empirical objectivity; in that their value does not consist; they are not products of intellection.

M. Récéjac attacks with great freedom all the difficulties of his subject. He does not hesitate, for example, to examine mystical alienation in its relations to pathological accidents and concludes as to the harmlessness of that state, which is normal, he says, although subject to aberrations. His book is interesting on several sides; it is a new witness of the sentimental reaction which is now overrunning our schools. For my part, I accept with M. Récéjac no more than with M. Bergson, the real existence of a thing "which has been created by us but which yet abides outside us." If we assume, to-day, the practical point of view, I do not think that the mystical act has even a genuine religious importance; it remains a subjective state, a privilege of certain souls, or of certain physiological temperaments, a *luxury* of the religious life. A scientific

conception of the world alone will give us the rule of life and the moral teachings necessary to society.

* * *

M. VICTOR HENRY transports us to a different field with his *Antinomies linguistiques.* I recommend the perusal of his little book which forms the second number of the *Bibliothèque de la Faculté des lettres de Paris.* M. Victor Henry is in several respects an innovator. He takes his stand upon exact psychological facts, he has the merit of not allowing himself to depart from the dictates of common sense in treating either of nature, of the origin of language, or of the relations between language and thought. He criticises, for example, with great acuteness, the current phrase "less words than thoughts" as applied to infant speech, and concludes to the contrary that children have fewer ideas than words, a new formula whose value depends on the nature of the psychical facts which the word "ideas" cover.

I quite approve of the distinction which M. Victor Henry establishes between transmitted language, that which we speak from infancy, and which is our thought itself, and acquired language (in its various forms). The dominating thought of his work is that, taking only transmitted language—the only true language, the only speech that really lives in us and merits the attention of the linguist as such—if language is a conscious fact, that is to say, if we speak, knowing what we speak, then the processes of language are unconscious, or, as I should prefer to say, are unperceived by the person speaking. It follows that the special science of language should reject *a priori* "every explanation of linguistic phenomena which in any way presupposes the exercise of the conscious activity of the speaking subject." Each of us wants to say what he says, and knows that he says it; but he introduces in his speech unwittingly continual modifications which most frequently are lost but sometimes are propagated by imitation. Hence the great permanence of language and its mobility at all moments.

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From M. ÉMILE FERRIÈRE, a scholarly author, and one who is never commonplace, we have *La Cause première d'après les données*

expérimentales. The unity of the laws of matter and energy throughout the whole universe, the substantial identity of matter and energy, the unity of life in animals and vegetables, the soul a function of the brain, such were the conclusions of his two preceding works *La Matière et l'énergie* and *La Vie et l'âme.* These conclusions are repeated in the present book and rounded off by a consideration of the first cause. The solution of the problem is based on a distinction between the *true* and the *real* (e. g., *true* triangles and *real* triangles), comprised as two aspects of the same fact. M. Ferrière does not establish his conclusions dialectically but deduces them from a *résumé* of scientific facts, a *résumé* which is his own work. He has a clear and happy way of reattacking the great problems of physics and natural history. Let it be noted that he rejects the theory of evolution (he limits it to the explanation of derived forms and denies its explaining types) with no less energy than he does the theory of successive creations. He justly reminds us that we must say "I do not know." The very impossibility, according to him, of explaining life, that is to say, the necessity of accepting as irreducible facts the principle and the plan (forms) of living beings, leads us to the affirmation of a first cause. But that cause is not transcendent with respect to the world. There are no two substances. In sum, M. Ferrière limits the definition of first cause to metaphysical attributes; he has imported into it neither moral attributes nor intellectual. His metaphysics appears as a necessity of human reason. I have certain reservations with regard to his doctrine, and certain corrections. In any event it is presented with freedom and a positive character in which certain recent systems of philosophy are too often lacking.

There remains to be mentioned, from the pen of M. PAUL JANET, who always remains a master, *Principes de métaphysique et de psychologie* (Delagrave, publisher); from the late L'ABBÉ DE BROGLIE a posthumous work, *Religion et critique,* (Lecoffre, publisher); from PAUL DUPROIX *Kant et Fichte et le problème de l'éducation* (F. Alcan, publisher); and from L'ABBÉ V. CHARBONNEL, *Le Congrès universel des religions en 1900, Histoire d'une idée* (A. Colin, publisher).

PARIS. LUCIEN ARRÉAT.

CRITICISMS AND DISCUSSIONS.

THE CONFLICT OF RACES: A REPLY TO CRITICISMS.

In the course of my later studies for a Theory of the Origin, History, and Future of Civilisation, the Conflict of Races has appeared to me to be a fact of fundamental importance. So general a phrase, however, may cover very different theories. So far as I am aware, the theory I have set forth under this name stands alone as a Theory of the Origins of Civilisation. But I read with great interest Professor Fiamingo's paper in your last issue adversely criticising the whole conception of a "Conflict of Races, Classes, and Societies." And I would now beg to be allowed to criticise his criticisms from the point of view of my own theory.[1]

To know the nature, and hence the history and future of any set of phenomena we must, as Aristotle insisted with profound insight, endeavor to ascertain its origin. And theories of civilisation can have little, if any, value without knowledge of the conditions under which it originated. Now the chief theories as to the origin of civilisation may be classified and characterised as (1) the *Family-Origin* Theory of Plato and Aristotle; then after the long night of the Christian Dark Ages, (2) the Sixteenth Century *Conquest-Origin* Theory of Bodin; (3) the Seventeenth and the Eighteenth Century *Contract-Origin* Theories of Hooker, Grotius, Hobbes and Locke, etc., to Rousseau; and (4) the *Savage-Origin* Theories now set forth as, for instance, by Dr. Tylor, Sir John Lubbock, and Mr. Spencer. In these current theories civilisation is more or less explicitly regarded as having originated spontaneously and sporadically somewhere, somehow, and somewhen at, it may be,

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1 This theory I first fully stated in 1887 in papers read at the April meeting of the Royal Historical Society, and the September meeting of the British Association, and afterwards published in full or in abstract in their respective *Transactions*. I had, however, partially stated the theory in previous publications,—only a development, as it is, of my *New Philosophy of History*, published in 1873. In exposition of this theory I have also, since 1887, both written papers published in abstract or otherwise in the *Transactions* of the International Congresses of Orientalists, the *Transactions* of the International Folklore Congress, the *Archæological Review*, *Folklore*, and other periodicals, and delivered lectures ("The Conflict of Races: A New Theory of the Origins of Civilisation") at the Philosophical Institution, Edinburgh, reported in the *Scotsman* from November 1893 to January 1894. And I may refer likewise to the essays in my editions of *The Women of Turkey and their Folklore*, Vol. I., 1890, Vol. II., 1891; *Greek Folksongs*, 1885 and 1888; and *Greek Folkpoesy*, 1896.

various different times and places, and all entirely unconnected with each other. And such appears to be the view of Professor Flamingo. But the recent results of Assyriological and Egyptological research have put the question as to the origins of civilisation, and therewith as to the conflict of races, on an entirely new basis. For I think I can say without fear of authoritative contradition that the main tendency of the results of modern research with reference to the origins of civilisation is to show that it originated in Chaldea and in Egypt at a date which may be at least approximately ascertained, and that from these twin centres all the civilisations, of the Old World at least, were directly or indirectly derived. The question, therefore, as to the origins of civilisation is now one of a scientific rather than merely speculative character. It is the definite question as to the conditions of the origin of definite primary civilisations; and to this question an increasingly verifiable answer is given by the rapidly accumulating results of ethnological and archæological research. For whatever speculative opinion may be as to the Conflict of Races, not merely the ancient traditions preserved by Berosus, but such physical facts as differences of skull and skeleton, differences of position in burial, and differences in painted, engraved, and sculptured portraitures show that unquestionably *one* of the conditions of the Origin of Civilisation was a difference and conflict of higher and lower races.

The question then arises as to the importance of this condition, and whether it was or not the chief and determining condition of that new species of human association which we term civilisation. But no scientific argument is possible without a preliminary definition of its subject, and such a definition as shall be but a generalisation of the facts investigated. Now, considering the facts revealed by investigation of Chaldean and Egyptian origins, and by a survey of civilisations generally, civilisation may, I think, be defined as *such a relation between higher and lower races or classes of the same race as results in enforced organisation of food-production and distribution, followed by such economic conditions as make possible the planning and execution of great public works, the invention and development of phonetic writing, and the initiation of intellectual development generally*. For I submit that the ultimate economic fact which distinguishes the civilised from the savage state is the change from the precarious savage mode of subsistence on wild-growing fruits gathered, and wild-running game killed as hunger urges, to the cultivation of plants and the domestication of animals, and the storage and regulated distribution of the food-supplies thus obtained. More briefly this is expressed by Mr. Payne in his great work (*The History of the New World Called America*) as "the substitution of an artificial for a natural basis of subsistence." And though he believes—what I doubt—that the ancient American civilisations were wholly unconnected with, or influenced by, those of the Old World, yet he agrees with me that, in the New World also, as, I believe, certainly in the Old, this great economic change was effected under the direction of—so far at least as governing capacities were concerned—a higher race. Of course, the

change from a natural to an artificial basis of subsistence may be partially effected in some tribes under the direction of native chiefs of superior intelligence and power of command. But what I submit is, that there is the reverse of any evidence of such a change having been effected on the large and systematic scale necessary to found a civilisation save under the direction of rulers belonging to a race either ethnologically or economically higher than that from which the labor and thrift were exacted which are no less naturally hateful than economically necessary.

"If it had not occupied the basin of the Mediterranean and united in itself all "the useful knowledge which belonged to the three continents of antiquity, the "white race," says Professor Fiamingo, "would never have been able to give to "the world the cosmopolitan civilisation which it has given." No doubt. But also if the race "occupying the basin of the Mediterranean" had been the black race, it would, judging from our knowledge of the race, not only in the present but during past thousands of years, certainly *not* have "united in itself all the useful knowledge, etc." And to say that "the civilisation which arose along the Mediterranean was not in fact due to this or that race, but was a result of natural geographic conditions," is simply to ignore all the vast mass of facts which prove that the ruling classes of Chaldea and Egypt belonged to the white race; that those of the Mediterranean civilisations belonged also to that race; and that without the commanding power which the white race has everywhere shown itself capable of exerting over other races, the fundamental economic condition of civilisation—the organisation of food-production and distribution—would never have been realised. It is not worth disputing whether it is, or not, "quite rare," as affirmed by Professor Fiamingo, that "peoples inhabiting contiguous regions present quite different ethnographic characteristics." It is sufficient to remark that the primary civilisations did, as a matter of fact, originate just at the line of junction of two regions inhabited respectively by peoples—the Equatorian Blacks and the Eurasian Whites—so different in their ethnographic characteristics that according to the ordinary practice of zoölogical classification they would be distinguished as different species. Who the "nations belonging to the white race" were or are who have, as the Professor asserts, "founded civilisations much inferior to the civilisation of the yellow race, or even of the black," he does not tell us, and I cannot imagine. For I do not know of *any* civilisation, save perhaps the ancient American, which has been founded otherwise than under the direction of men belonging to one or other of the white races. By white races I mean races with either long or short heads, high noses, unprojecting jaws, long hair and beards, and light-colored skins. And for the races thus generally distinguishable—and of which the three great historic branches are: (1) the Archaians (as I have named the white races of the earlier civilisations), (2) the Semites, and (3) the Aryans—I have proposed the term *Hypenetian*, from ὑπηνήτης "a bearded man."

I shall but add that in countries which have reached the higher stages of civilisation the old differences of race have disappeared in the sentiment of a common

nationality arising partly from general intermarriage and partly from equal laws But the conflict of races has ceased only in a transformation into a conflict of classes, an economic conflict of workers and capitalists,—a conflict of so very real and stern a character as to make Professor Fiamingo's talk of "the *pretended* Conflict of Classes" almost amusing. This conflict has still to run its course; but in the future we may foresee yet another transformation of the social conflict,—a conflict not of different races and classes in fierce opposition, but of different aptitudes in voluntary co-operation, in their due spheres, for the common good,—a sociological analogous to the biological, conflict of anabolic and katabolic energies in the metabolism of a healthy organism.

J. S. STUART-GLENNIE.

HASLEMERE, ENGLAND.

ANIMAL AUTOMATISM AND CONSCIOUSNESS.

The interest of Prof. Lloyd Morgan's October article lies mainly in its deterministic significance. Some want of clearness, noticeable here and there, is caused by uncertainty as to the precise sense in which the late Professor Huxley used the ambiguous term "automata," and by a rather intricate effort to decide this, and to reach a better definition.

The word "automatic" "has received," says Dr. Augustus Waller, "two diametrically opposed meanings, viz, (1) Self-moving, self-arising, spontaneous, in "literal translation of *αὐτό-ματος*; (2) automaton-like, that is to say, like a mechanism that appears to be self-moving, but that we know to be moved by secret "springs and hidden keys."[1] Professor Huxley seems to have used "automata" in the second of these senses, as a compact synonym for "machines which appear to be, but are not, self-moving." Professor Morgan, however, thinks that it may be "fairly inferred from what is explicitly or implicitly contained" in Professor Huxley's essay that he used the term as "applicable to any mechanism all the workings of which at any given time are explicable in terms of physical causation." He then objects to this "inferred" definition because, he thinks, it is not in accordance with general usage, not helpful in the study of animal life, and does not preserve the spirit of Descartes's teaching. And he proposes (p. 8) this "more restricted" definition: "Automatic action is that which is performed without the "immediate and effective intervention of those molecular changes in the cerebral "cortex which are accompanied by consciousness (such intervention being rendered "possible by association)."

The root of the matter seems to lie not in the subsidiary inquiry, How should "automata" be defined? but in the much deeper question, Does volition cause and control "voluntary" acts?

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1 *Human Physiology*, third edition, p. 293.

Professor Huxley's opinion that it does not, appears to have been based on his conception of volition as being, like other states of consciousness, and sensations generally, an "immaterial entity," without any attributes in common with the attributes ascribed to matter, impervious to any contact with material particles, and, consequently, unable to be impressed by, or to impress, matter in motion. "The "sense organ," he says,[1] "stands as a firm and impervious barrier through which "no material particle of the world without can make its way to the world within.' "With the sensorium, matter and motion come to an end; while phenomena of "another order, or immaterial states of consciousness, make their appearance. "How is the relation between the material and the immaterial to be conceived? "This is the metaphysical problem of problems."[2]

These considerations led him to suggest, in 1874, that the difficulty in imagining "that volition, which is a state of consciousness, and, as such, has not the "slightest community of nature with matter in motion, can act upon the moving "matter of which the body is composed, as it is assumed to do in voluntary "acts," is to be met by the supposition that voluntary acts are as purely mechanical as other actions, "and are simply accompanied by the state of consciousness called volition . . . volitions do not enter into the chain of causation . . . at all."[3]

In 1870 he had expressed the opposite view that a voluntary act primarily requires a distinct consciousness and volition of its details. "Our voluntary acts con-"sist of two parts: firstly, we desire to perform a certain action, and, secondly, "we somehow set a-going a machinery which does what we desire. But so little "do we directly influence that machinery, that nine-tenths of us do not even know "of its existence. . . . We desire the utterance of certain words: we touch the "spring of the word machine, and they are spoken. Just as Descartes's engineer, "when he wanted a particular hydraulic machine to play, had only to turn a tap, "and what he wished was done. . . . If the act which primarily requires a distinct "consciousness and volition of its details, always needed the same effort, educa-"tion would be an impossibility."[4]

The explanation of this inconsistency is to be found, probably, in the instability of Professor Huxley's intellectual attitude towards the "problem of problems." He seems to have felt under no obligation to form a final opinion about it, and when, sometimes, it seemed necessary to indicate a preference for one or other of the various conflicting solutions, his choice was more or less qualified and provisional. When, in 1870, he held that an act "primarily," i. e., until it has become, by repetition, mechanical, "requires a distinct consciousness and volition of its details, he evidently did not regard volition as an immaterial entity, unable to impress, or be impressed by, moving matter. When, however, he stated, in 1874, that volitions do not enter into the chain of causation of voluntary acts at all, he was under the influence of that dualistic conception. For at that time he thought

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1 *Collected Essays*, VI., p 299. 2 *Ibid.*, VI., p, 304. 3 *Ibid.*, I., 241. 4 *Ibid.*, I., pp. 187, 188.

that "of two alternatives," the dualistic and materialistic, "one must be true. "Either consciousness is a function of something distinct from the brain, which "we call the soul, and a sensation is the mode in which this soul is affected by the "mode of motion of a part of the brain, or there is no soul, and a sensation is "something generated by the mode of motion of a part of the brain. In the for- "mer case the phenomena of the senses are purely spiritual affections, in the latter "they are something manufactured by the mechanism of the body."[1] Of these alternatives he at this time (1874) accepted the dualistic, since he was "utterly incapable of conceiving the existence of matter if there is no mind in which to picture that existence."[2]

In 1879 he remarked about these two speculations, and a third,—"that the sensation is, neither directly nor indirectly, an effect of the mode of motion of the sensorium, but that it has an independent cause,"—that neither of them "can be regarded as anything but a more or less convenient working hypothesis." "But," he added, "if I must choose between them, I take the 'law of parsimony' for my guide, and select the simplest, namely, that the sensation is the direct effect of the mode of motion of the sensorium."[3] "In ultimate analysis, then, it appears that a sensation is the equivalent in terms of consciousness for a mode of motion of the matter of the sensorium."[4] This conclusion, whether materialistic or monistic, is in marked contrast with the strongly expressed dualistic preference in 1874.

In 1886 he repudiated, "as philosophic error, the doctrine of materialism," as he understood it, heartily disbelieving its main tenet "that there is nothing in the universe but matter and force," and holding "that there is a third thing . . . to-wit, consciousness," which he could not see "to be matter or force, or any conceivable modification of either."[5] "If," he at this time wrote, "I were forced to choose be- "tween materialism and idealism, I should elect for the latter; and I certainly "would have nothing to do with the effete mythology of spiritualism. But I am "not aware that I am under any compulsion to choose either the one or the other."[6]

In 1894 he seems to have inclined once more to the materialistic solution. For in a note of that year on Descartes's view that animals are non-sentient mechanism, but that the human soul, "which alone feels and thinks, is extra-natural—a something divinely created and added to the anthropoid mechanism," he remarked: "Descartes's denial of sensation to the lower animals is a necessary consequence of "his hypothesis concerning the nature and origin of the soul. He was too logical "a thinker not to be aware that, if he admitted even the most elementary form of "consciousness to be a product or a necessary concomitant of material mechanism, "the assumption of the existence of a thinking substance, apart from matter, "would become superfluous."[7]

But Professor Huxley himself went far beyond the mere making of this admis-

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1 *Ibid.*, I., p. 210. 2 *Ibid.*, I., p. 245. 3 *Ibid.*, VI., p. 306. 4 *Ibid.*, VI., p. 317.
5 *Ibid.*, IX., pp. 128, 129, 130. 6 *Ibid.*, IX., p. 133. 7 *Ibid.*, VI., p. 246.

sion. He definitely pronounced that "there is no doubt that a molecular change in some parts of the cerebral substance, is an indispensable antecedent to every phenomenon of consciousness."[1] That is to say, he accepted as scientifically established a process in the genesis of consciousness which, by his own showing, makes the dualistic "assumption of the existence of a thinking substance apart from matter,"—a thinking "immaterial entity,"—superfluous, and therefore, by "the law of parsimony," inadmissible. The greater includes the less, and the blow thus dealt by him to his own occasional support of the dualistic hypothesis is equally destructive to his conception of volition as unable to impress moving matter because, being an immaterial entity, it has "not the slightest community of nature" with it.

It does not, however, follow, from the unsoundness of the particular grounds on which Professor Huxley based his conclusion, that the conclusion itself is inadmissible. Before it can be safely maintained that he was wrong in holding that volition is only "an emotion indicative of physical changes, not a cause of such changes,"[2] it must be shown that Professor Ziehen is in error when he says that "that which we call will, on strict analysis, is reduced essentially to the tension accompanying the association of ideas[3] and the action"; that "motor ideas,"[3] produced by the association of ideas, are themselves able to produce "motor innervation";[4] and that that which finally causes the idea of a movement which is accompanied "by the stronger tone of feeling" to prevail, and suppresses the idea of not performing that movement, or of performing others, "is not a special faculty exercising free will, but only the stronger emotional tone and greater associative affinity of the prevailing idea, combined with the favorable grouping of the latent mental images. Our actions are as strictly necessitated as our thoughts."[5]

In opposition to these opinions Prof. Lloyd Morgan appears to regard volition as a special faculty, exercised by the cerebral cortex, and causing and controlling "voluntary" action. "The cerebral cortex is," he thinks, "the organ of control . . . in its own right." It is "not the instrument of that which controls, but *is*, from the physical point of view, that which controls." (P. 7.) He draws a distinction in kind, where modern physiology appears to recognise only a distinction in degree, between the "co-ordination which is seen in reflex action and in instinctive response," and that "which is seen in voluntary action and renders acquisition possible." (P. 11.) Of this higher type of co-ordination he says: "It "exercises a more or less modifying influence on instinctive responses, and thus "lifts them above the level of automatism. It involves the direct intervention of "those molecular cortical processes which have for their conscious concomitants

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1 *Lessons in Elementary Physiology*, 1885. P. 300.

2 *Ibid.*, I., 240.

3 *Introduction to Physiological Psychology*, translated by Drs. Van Liew and Beyer. Second edition, p. 28.

4 *Ibid.*, p. 275. 5 *Ibid.*, pp. 296, 297.

"what we term 'choice' based on previous individual experience and dependent "upon the association of impressions and ideas." (P. 11.) "On this conscious "selection and choice depends . . . the whole of mental as contrasted with merely "biological evolution. On it, too, depends the distinction between animal automa-"tism, in the restricted sense here advocated, and those higher powers which, "though founded thereon, constitute a new field of evolutionary progress." (P. 18.)

But these lower and higher "types" of "regulative co-ordination," in the view of eminent physiologists of the day, are the workings of lower and higher grades of automatism. "All these facts," says Prof. Michael Foster, (with reference to the spontaneous movements of frogs and pigeons after removal of their cerebral hemispheres), "seem to point to the conclusion that what may be called mechanical "spontaneity, sometimes spoken of as 'automatism,' differs from the spontaneity "of the 'will,' in degree rather than in kind. Looking at the matter from a purely "physiological point of view, . . . the real difference between an automatic act "and a voluntary act is that the chain of physiological events between the act and "its physiological cause, is in the one case short and simple in the other long and "complex."[1] "The difference," says Professor Ferrier, distinguishing between impulsive and deliberate actions, "is not in kind, but only in degree of complexity; "for in the end actions conditioned by the resultant of a complex system of asso-"ciations are of essentially the same character as those conditioned by the simple "stimulus of a present feeling or desire, where no other associations have as yet "been formed capable of modifying it."[2] So, also, Dr. Augustus Waller remarks: "Objectively viewed in the conduct of living beings as it unfolds itself before us "voluntary action appears as a highly disguised and complicated form of reflex ac-"tion, with its causal excitations more or less concealed, more or less deeply buried "in the past history of the individual or of the ancestors."[3] And: "If the doc-"trine of spontaneous volition be accepted (an admission which seems to entail "acceptance of the view that effects may occur without causes, or phenomena with-"out generators) the voluntary act commences at the cortical motor cell. But it "is more logical to admit that previous sensations have been registered, and that "volition is a resultant of past as well as of present sensations."[4]

Analyse "what we term 'choice'" and it is seen to be the inevitable victory of the strongest among conflicting motives. Where such conflict exists, "action," says Professor Ferrier, "is conditioned by the stronger."[5] No one has stated this more plainly, though not altogether accurately, than Prof. Lloyd Morgan himself. "Volition," he says, "is the faculty of the forked way. There are two possibili-"ties, fulfilment in action, or inhibition. I can write or I can cease writing; I can "strike or I can forbear. . . . For volition involves an antagonism of motives, one

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1 *Text-book of Physiology*, fifth edition, p. 1004.

2 *Functions of the Brain*, second edition, p. 440.

3 *Human Physiology*, third edition, p. 296. 4 *Ibid.*, p. 297. 5 *Functions of the Brain*, p. 439.

"or more prompting to action, one or more prompting to restraint. The organism "yields to the strongest prompting, acts or refrains from acting according as one "motive or set of motives prevails; in other words, according as the stimuli to "action or the inhibitory stimuli are the more powerful."[1]

But if the organism yields to "the strongest prompting," and action is determined by it, "choice," in the ordinary sense, disappears. Of Professor Morgan's "two possibilities" one only, the following of the strongest impulse, can exist. The cerebral cortex cannot be the organ of control "in its own right," but must be merely "the instrument of that which controls." It, equally with "the lower brain centres which are concerned with automatism in the more restricted sense," is seen to be itself controlled, since "the actions which we term voluntary," and are "the effects of those molecular changes in the cortex which are accompanied by consciousness," are conditioned and determined, not by independent working of the cortex, but by the strongest of the various stimuli which cause molecular changes in its substance.

Either, then, it seems, Prof. Lloyd Morgan must give up his present belief that "the organism yields to the strongest prompting" or his conclusion that actions, whether of animals or men, cease to be automatic, that is, mechanical and "determined," when they are the result of "conscious selection and choice." So long as he retains his belief in the victory of "the strongest prompting," it seems impossible to distinguish logically, between his determinism and that of Professor Huxley and the Editor. He has already expressed a view[2] similar to theirs,[3] as to the way by which a reconciliation—(hollow, as I venture to think, and unreal)—may be brought about between determinism and "freedom."

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1 *Animal Life and Intelligence*, p. 459.

2 *Introduction to Comparative Psychology*, p. 340.

3 *Collected Essays*, I., pp. 240, 244; VI., p. 220; IX., p. 141. *The Monist*, III., p. 87, "The Idea of Necessity."

BOOK REVIEWS.

PISTIS SOPHIA. A Gnostic Gospel (with Extracts from the Books of the Saviour appended), originally translated from Greek into Coptic and now for the first time Englished from *Schwartze's* Latin version of the only known Coptic MS. and checked by *Amélineau's* French version with an introduction by *G. R. S. Mead*, B. A., M. R. A. S. London: The Theosophical Publishing Society, 26 Charing Cross, S. W.

Pistis Sophia is the title of an interesting MS. in the possession of the British Museum which belongs to the large class of gnostic literature that characterises the religious aspirations of the beginning of the Christian era. The words "Pistis Sophia" are apparently incorrect, but the most probable form, ΠΙΣΤΗ ΣΟΦΙΑ, viz., the Faithful Wisdom, suggested by Dulaurier and Renan, has not as yet been accepted. The best translation was made into Latin from the Coptic original by M. G. Schwartze and edited after his premature death by his friend and colleague, J. H. Petermann. Mr. Mead has undertaken the meritorious task of rendering Schwartze's translation into English, which he has collated with Amélineau's French version and prefaced with an appropriate introduction.

The probable history of the Pistis Sophia, according to Mr. Mead, was as follows: "I am convinced that the original was no other than the famous Apoca-"lypse of Sophia, composed by Valentinus, the most learned doctor of the Gnosis, "who lived for thirty years in Egypt in the latter half of the second century, and "was also a master of the Greek language, in which he wrote his treatises. . . . 'The original Greek treatise of the Pistis Sophia was compiled by Valentinus in "the latter half of the second century, perhaps in Alexandria. By 'compiled' I "mean that the Apocalypse of Sophia, or whatever its title may have been, was "not invented from first to last by Valentinus. The traditional framework of the "narrative, the selection of texts and passages from other scriptures, Hebrew, "Christian, Egyptian, Chaldæan, Æthiopic, etc., or whatever they may have been, "and the adaptation of nomenclature, were his share of the task; but it is evident "that in many places he was translating or paraphrasing himself, and that he had "great difficulty in turning some of the Oriental terms into Greek." A copy of Val-

entinus's book, Mr. Mead suggests, was carried up the Nile, where it was translated into the Coptic vernacular of the country.

The MS. of the Pistis Sophia is in parts incomplete, in other parts full of repetitions. There are also a number of leaves written by the same copyist which contain long quotations from the *Books of the Saviour*. Therefore Mr. Mead suggests "that the translator must have either translated, or possessed a translation of, The "Books of the Saviour and The Books of Ieou. These were also most probably "a compilation of Valentinus, or perhaps The Books of the Saviour were a com "pilation of Valentinus from the older Books of Ieou, which may have belonged "to the Æthiopic Enochian literature, for they are stated in the Pistis Sophia "(pages 246 and 354) to have been written down in Paradise by Enoch, and pre-"served from the Flood."

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It is noteworthy that the author of Pistis Sophia does not seem to be familiar with the doctrine of Christ's ascension for he states that when Jesus had risen from the dead he passed eleven years with his disciples and gave them instruction about the various mysteries of the universe and its emanations, revealing to them what occultists of to-day would call "an esoteric Christianity." They sat on the Mount of Olives on the day of the full moon and a stream of immeasurable light fell on Jesus. He rose into the air, was received by the archangels in heaven, and descended again, shining exceedingly. He then explains to his disciples that he had thrown powers into the wombs of their mothers which are now incarnated in them and that John the Baptist was Elias in one of his former births. Jesus tells how he put on his vesture and went through the spheres and æons, converting them, and overcoming Adamus the tyrant and all the tyrants who were adversaries of the light. And Melchisedec appears as the receiver and the purifier of light, who carries the light into the treasure of light. In the thirteenth æon Jesus withdrew the veil and found Pistis Sophia, one of the twenty-four emanations, who, when she saw the mystery of her name and all the glory of that mystery written on his vesture, began to sing a song. Jesus explains that Pistis Sophia had become guilty of a desire to gaze into the height above her, which made her forget to attend to the mystery of her region, and the twelve æons below her hated her and decoyed her to look down. "Arrogant," the great triple power, joined the æons and induced Sophia to gaze into the lower parts that she might there see his light-power, which has the face of a lion. These adversaries of Sophia succeeded in expelling her light, and when she fell down into the darkness of chaos she began to understand that she had sinned, and uttered thirteen repentances, which are interpreted and commented upon by various disciples. Then Jesus produced out of himself a light-power and sent it into the chaos to Pistis Sophia to bring her up again from the depths into which she had fallen. She sings: "I will sing a song "unto thee, O light, for I have desired to come unto thee; I will sing thee a song, "O light, for thou art my saviour; leave me not in chaos. Save me, light of the

"height, for unto thee have I sung a song." Then, apparently identifying Jesus with the light, she continues: "Thou has sent me thy light from thyself, and "thou hast saved me. Thou hast brought me to the higher regions of chaos. . . . "The emanations of Arrogant have designed to take away my light, but have not "been able to take it; for thy light-power is with me, and they have taken counsel "together without thy commandment, O light. For this cause have they not been "able to take away my light, because I have trusted in the light. I shall not be "afraid; the light is my saviour, and I will not fear."

Jesus then explains that the redemption of Pistis Sophia from the darkness of chaos is the consummation of the first mystery. The book closes with various interpretations of David's prophecy that "Mercy and Truth are met together; righteousness and peace have kissed each other."

The second book tells of the help afforded to Pistis Sophia by archangels and a light-stream; but she is again distressed by Arrogant, who calls on all the dæmonial powers to drag her down again. At last Pistis Sophia is rescued and transfigured. She is "tabernacled in the midst of the light, a mighty light being on her left and on her right, and on all sides, forming a crown on her head." New songs of praise and explanations of the mysteries follow, the details of which might prove tiresome to the readers of the present generation.

The purpose of the mysteries is explained by Jesus in these words: "'I came "not to call the righteous.' Now, therefore, I have brought the mysteries that the "sins of all men may be remitted, and they be brought into the kingdom of "light."

When the disciples lose courage to understand the mystery of the ineffable Jesus comforts them, saying: "Whosoever shall renounce the whole world and all "therein, and shall submit himself to the divinity, to him that mystery [of the in-"effable] shall be far more easy than all the mysteries of the kingdom of light; it "is far simpler to understand than all the rest, and it is far clearer than them all. "He who shall arrive at a knowledge of that mystery, hath renounced the whole of "this world and all its cares. For this cause have I said to you aforetime, 'Come "'unto me all ye that are oppressed with cares and labor under their weight, and "'I will give you rest, for my burden is light and my yoke easy.' Now, therefore, "he who shall receive that mystery, hath renounced the whole world, and all the "material cares that are therein.

"Wherefore, my disciples, grieve not, thinking that ye will never understand "that mystery. Amen, I say unto you, that mystery is far simpler to understand "than all mysteries; and amen, I say unto you, that mystery is yours and also his "whosoever shall renounce the whole world and all the matter that is therein.

"Now, therefore, hearken, O my disciples, my friends and my brethren, that I "may impel you to the understanding of that mystery of the ineffable. These "things I say unto you, because I have already instructed you in every gnosis

"in the emanation of the pleroma; for the emanation of the pleroma is its "gnosis.

". . . . All those men who shall have received the mystery in that ineffable, "shall be fellow-kings with me, they shall sit on my right hand and on my left "in my kingdom.

"Amen, I say unto you, those men are myself, and I am these men."

The psychology of the Pistis Sophia is peculiarly interesting. The soul is said to be a compound fashioned by the five great rulers in due proportion from the sweat, the tears, and the breath of the mouth of the rulers; old souls can be refashioned by the five great rulers, but they let them first drink the draught of oblivion, which is a mixture from the seed of iniquity. This draught of oblivion produces the counterfeit of the spirit (which may be the old Egyptian idea of the double), which is distinct from the soul as an envelope or vesture that, even without the soul, may continue to lead a kind of ghost existence. After death "the coun-"terfeit of the spirit bringeth that soul unto the virgin of light, and the virgin of "light, the judge, handeth over that soul to one of her receivers, and her receiver "casteth it into the spheres of the æons, and it is not set free from transmigrations "into bodies until it giveth signs of being in its last cycle."

". . . . The counterfeit of the spirit beareth witness to every sin which the soul "hath committed, ... sealeth every sin that it may be stamped on the soul so "that all the rulers of the torments of sinners may know that it is the soul of a sin-"ner, and may be informed of the number of sins which it hath committed, by the "number of seals which the counterfeit of the spirit hath stamped upon it, so that "they may chastise it according to the number of sins which it hath committed "This is the fashion in which they treat the soul of the sinner."

Ieou, the overseer of the light, is set as a watch over the dragon, into whose mouth all the blasphemers, heretics, and irredeemable sinners are cast (p. 323), and their torments will be more painful than all former chastisement of the judgments; they will be imprisoned in relentless ice and scorching fire, and they shall perish and shall become non-existent for eternity (p. 324). But the soul that has "exhausted the cycles of transmigration, shall be brought unto the seven virgins of "light who preside over baptism, that they may baptise that soul, and seal it with "the sign of the kingdom of that ineffable, and bring it into the orders of the "light; . . . . they will become flames of light, or streams of light, that they may "pass through all the regions until they come into the region of the inheritance."

The quotations from the Books of the Saviour are written in the same spirit as Pistis Sophia, treating of the doctrine of punishment of blasphemers, heretics, and the wicked; and the salvation of those that have received the mysteries. Jesus, the great initiator, preaches this to his disciples in Amenti (which is the Egyptian Nether World), and the disciples answer: "Woe, woe unto sinners, on whom the "indifference and forgetfulness of the rulers lie heavily, until they pass out of the "body to suffer these torments! Have mercy upon us, have mercy upon us, son

"of holiness, that we may be saved from these torments and these judgments "which are prepared for sinners, for we also have sinned, O master, our light."

The apocryphal books, especially the expositions of the various gnostic schools, are very important for the sake of comprehending that great religious movement that produced as a final result the Christian Church. But for that reason it is not necessary (as Mr. Mead believes) that the treatment of "Gnosticism in a really "comprehensible manner requires not only a writer who at least believes in the "possibilities of magic, but is also a mystic himself, or at least one who is in sym- "pathy with mysticism." *κρς*

DIE IRRTHUMSLOSIGKEIT JESU CHRISTI UND DER CHRISTLICHE GLAUBE. Ein Nachwort zu der Schrift: "Konnte Jesus irren?" Von *Dr. Paul Schwartzkopff*. Giessen: J. Ricker'sche Buchhandlung. 1897. Price, M. 2.00.

Professor Schwartzkopff's little pamphlet *Konnte Jesus irren?* has hit the central problem of modern theology, and we do not hesitate to say, in spite of the protest of Zöckler and of other prominent divines, that the solution which Schwartzkopff offers is the only one on which the traditional orthodoxy can take its stand. In reply to Professor Zöckler, Schwartzkopff says: "As far as I myself am concerned in this matter, I can assure Dr. Zöckler that the bitterest anxiety of heart alone has compelled me after years of careful investigation to recognise this error of Jesus" (viz., the prophecy concerning the second advent).

Schwartzkopff emphasises the difference of sinlessness and freedom from error; he has not lost confidence in the sinlessness of Jesus, but sinlessness does not imply omniscience. Ignorance is not a sin, and ignorance naturally and necessarily leads to error. Infallibility concerning all moral truths that have reference to God's plan of salvation does not include a general infallibility in all respects; the former is evidence of the divinity of Jesus and would prove that he was the Christ, but a general infallibility would render the humanity of Jesus impossible and thus lead to docetism.

Professor Schwartzkopff has been attacked by several prominent theologians from the orthodox ranks, but their attacks only prove the importance of the problem and the necessity of solving it. There is no use of shutting one's eyes to it after the ostrich fashion. Schwartzkopff himself comes from the orthodox ranks and has, so far as it is possible for a scholar and thinker, preserved the traditions of the old dogmatism; but he found his faith seriously jeopardised by those statements in the New Testament which contain unequivocal errors, as, for instance, the idea of Jesus, that his second advent would take place during his own generation.

Schwartzkopff characterises his solution of the problem in the following words of the conclusion:

"For those who see in Jesus a mere man, his fallibility is unquestionable and "a matter of course. But they who are convinced that in the sinless Son of God

"the personal God himself is bodily revealed in his profoundest essence, will, when "confronted with some of the accredited utterances of Jesus, certainly be led to "inquire whether his perfect community with God could have absolutely protected "him from error. If, as I have shown, the possibility, nay, the necessity of cer-"tain errors is deducible from the very character and origin of human perception "and thought as such, then he who would deny this to Jesus would practically "make a docetic denial of his true humanity. But the person who does not go "thus far dare not accuse me of annulling his true divinity when I hold that the "fallibility of Jesus in matters not pertaining to salvation is possible and demon-"strable.

"If my proof stands, then the widespread opinion that error can only proceed "from sin is fully refuted by the psychological facts, as is also the conclusion "therefrom that Jesus must have been absolutely errorless and absolutely sinless. "The fact remains that the saying, 'To err is human,' is also applicable to Jesus, "not because he was *merely* a man, but because he was *truly* a man.

"But if Jesus really did err in certain things, theology cannot escape from the "obligation, not *to give up*—I am far from saying that—but *so to conceive* his di-"vinity that we can squarely reckon with established facts and that no direct con-"tradiction shall obtain concerning them. This forces us above all to a modifica-"tion of the old ecclesiastical conception of the Dual Nature and of Anselm's doc-"trine of reconciliation, which in their primitive meaning can scarcely be upheld "to-day by any theologian." κρς.

PHILOSOPHY OF THEISM. Being the Gifford Lectures, Delivered Before the University of Edinburgh in 1894–95. By *Alexander Campbell Fraser, LL. D.* Edinburgh and London: William Blackwood and Sons. Two series. Vol. I. 1896. Pages, 303. Vol. II. 1896. Pages, xiii, 288.

It is a fine series of volumes that have sprung from the foundation of the late Lord Gifford at Glasgow. And not the least is the last work—the present two series of lectures—by the venerable Emeritus Professor of Logic and Metaphysics in the University of Edinburgh, Alexander Campbell Fraser, a man of the maturest philosophical culture, who has earned the gratitude of the thinking world by his splendid monumental editions of Locke and Berkeley. At the close of his life he is called upon to deliver his judgment, born of a ripe thought and feeling, upon the greatest problem with which the human mind has occupied itself. He says: "My first "words must give expression to the emotion which I feel on finding myself once "more admitted to speak officially within the walls of this ancient university, with "which, as student, graduate, and professor, I have been connected for sixty years. "For it is sixty years in this November since I first cast eyes of wonder on the "academic walls which now carry so many memories in my mind, and which to-"day are associated with an extraordinary responsibility. In the evening of life,

"in reluctant response to the unexpected invitation of the patrons of the Gifford "Trust, I find myself, in the presence of my countrymen, called to say honestly "the best that may be in me concerning the supreme problem of human life, our "relation to which at last determines the answers to all questions which can "engage the mind of man. No words that I can find are sufficient to represent my "sense of the honor thus conferred, or the responsibility thus imposed, upon one "who believed that he had bid a final farewell to appearances in public of this "sort, in order to wind up his account with this mysterious life of sense."

How liberal were the intentions of Lord Gifford may be learned from the following words of his bequest: "The lecturers appointed shall . . . . . be sub-"jected to no test of any kind, and shall not be required to take an oath, or to make "any promise of any kind; they may be of any denomination whatever, or of no "denomination at all (and many earnest and highminded men prefer to belong to "no ecclesiastical denomination); they may be of any religion or way of thinking, "or, as it is sometimes said, they may be of no religion; or they may be called "sceptics, agnostics, or free-thinkers, . . . it being desirable that the subject be "promoted and illustrated by different minds."

On the other hand we have something approaching a definition in the following characterisation by Lord Gifford of the subject of the lectures: "God, the Infinite, the All, the First and Only Cause, the One and the Sole Substance, the Sole Being, the Sole, Reality, and the Sole Existence."

And the definition is significant, for it is characteristic of theological thought not to examine facts and to lead them to their own interpretation, but to proceed anteriorly from abstract notions and to mould the facts to the notions. Why a theological inquirer should start with the notions of Infinite, First Cause, Sole Being, Perfect Moral Person, Sole Reality, etc., is unintelligible to the scientific inquirer who always seeks to reach his results before he postulates them. Professor Fraser after examining in his first volume the conceptions of Universal Materialism, Panegoism, Pantheism, and Agnosticism, and finding them unsatisfactory, resorts to man's personality as the principle of interpretation. He stands before the dilemma: *Homo mensura*, or *Nulla mensura*. "Does God, or the final principle, mean "only the ultimately inexplicable natural order; or does God mean ever-active "moral reason and purpose, at the root of an always divinely sustained physical "order, in which God is Supreme?" And again: "The deepest and truest thought "man can have about the outside world, is that in which the natural universe is "conceived as the immediate manifestation of the divine or infinite Person, in "moral relation to imperfect persons, who, in and through their experience of what "is, are undergoing intellectual and spiritual education in really divine surround-"ings." And further: "*Man at his highest*, acting freely under moral obliga-"tion, with its implied intellectual and moral postulates, is suggested as a more "fitting key to the ultimate interpretation of things than man only as an animal "organism, abstracted from the moral experience that is often unconscious in the

"human individual, but is realised fully in the Ideal Man, and can be disclaimed "by imperfect men only by disclaiming human responsibility."

In this way the author reaches his definition of God, and proves his existence as we prove the existence of other minds than ours. His standpoint is essentially that of faith as an escape from the horrible implications of mechanicalism, his demonstrative principle *postulates* "morally perfect Power as at the root of the physical, æsthetical, and spiritual experience of mankind, although with a background of inevitable mystery." He has an explanation of miracles, at least of miracles as rationalised, and he finds in "optimist trust" the highest human philosophy as opposed to the grim and awful sufferings of the world, which so sorely shake the theistic faith. This last is done in the second volume.

Notable are the candour and fair tolerant tone of the author in his treatment of the opinions of others, to which he gives the fullest weight in his power. The examination of the theistic and atheistic testimony of the world is in fact the finest feature of the work. *μκρκ.*

GREEK FOLK POESY. Annotated Translations from the Whole Cycle of Romaic Folk-Verse and Folk-Prose. By *Lucy M. J. Garnett.* Edited with Essays on the Science of Folklore, Greek Folkspeech, and the Survival of Paganism, by *J. S. Stuart-Glennie, M. A.* Vol. I. Folk-Verse. Pages, 477+lvi. Vol. II. Folk-Prose. Pages, 541+ix. London: David Nutt. 1896.

These two handsome volumes are the work of two scholars. The translations of the modern Greek Folk-Verse and Folk-Prose, constituting the bulk of the work, and which, owing to the multitude of Grecised foreign words, the poverty of dialectical grammatical forms, and the varied contractions and elisions that occur in the language, were very difficult, has been made by Miss Lucy M. J. Garnett who possesses exceptional knowledge in this field of linguistics, while all the learned paraphernalia, the annotations, the critical and scientific introductions have been supplied by that well known scholar Mr. J. S. Stuart-Glennie. The work, which places a vast amount of hitherto inaccessible material within the reach of English Folklorists, is thus accompanied by all the erudite equipment which is so necessary to prevent such researches from running afield and from culminating in hedonistic dilettantism and in the collection of vast heaps of linguistic rubbish born of a sheer delight in the labor of accumulation. Mr. Glennie has supplied (1) a General Preface, in which he traces the history of folklore researches and seeks to point out the way in which they may be turned to practical account in the furtherment of a philosophical knowledge of the world; (2) a Preface proper, in which he gives the history of the special Greek Folk Poesy which he and Miss Garnet have collected in this work; (3) an exhaustive Introduction on the Science of Folklore, where his learning and insight show to special advantage; and (4) a conclusion on the Survival of Paganism, in which the author proposes a solution of the questions of the origin of supernatural gods, and of the origin of natural causation. It is Mr.

Glennie's purpose to determine the character of the "Primitive Conception" of nature so called, and hence of the truth there may be in Comte's theory of fetishism, Tyler's theory of animism, and Spencer's theory of spiritism. This is a problem, he contends, the solution of which is a *sine qua non* for a scientific theory of the origin of the history of religion. In Folk Poesies, that conception he believes may be best ascertained if we make ourselves thoroughly master of the folk dialects in which they are expressed, and if, above all, the Folk Poesy specially chosen for study has been little if at all affected by the conceptions of the great Culture-Religions. Both on account of the possibility of mastering its language and of the little influence on it of Christianity, the study of Greek Folk Poesy has appeared to him to be specially important for the rectification of two grave defects in the philosophy of history—viz., "the lack, as yet, of a verified theory of the Conditions of the Origin of progressive Social Organisation, or Civilisation; and, further, the lack of a verified theory of the Conditions of the Origin of progressive Philosophic Thought, or Ratiocination." The solution of the problem set by the first of these defects must primarily be drawn from the results of historical, archæological, and ethnological research; but the solution of the problem set by the second of these defects depends mainly on the results of folklore research. With a view, therefore, chiefly to the solution of this problem of thought-origins and hence of thought-development, the representative pieces of Greek Folk-Poesy which make up this work have been translated and arranged in such classes as to make them available for the purposes of scientific generalisation. These classes are three in number, viz., mythological idylls and tales, social songs and stories, historical ballads and legends, the first of which is divided into three sections: Zoönist, Magical, and Supernalist; the second into Antenuptial, Family, and Communal; and the third into Byzantine, Ottoman, and Hellenic. From a private communication we learn that Mr. Stuart-Glennie would now prefer to substitute the term *Panzoism* for *Zoönism*. Mr. Stuart-Glennie's contribution to *Criticisms and Discussions* in the present *Monist* affords an opportune occasion for our readers to acquaint themselves with his views on the origin of civilisation, which form the complement to the present work. *μκρκ*

CONTRIBUTIONS TO THE SCIENCE OF MYTHOLOGY. By the Right Honorable *Prof F. Max Müller, K. M.*, Member of the French Institute. Two Volumes, Longmans, Green & Co.: London, New York, and Bombay. 1897. Total number of pages, 864. Price, $8.00,

To his imposing series of works on *The Science of Language*, *The Science of Religion*, and *The Science of Thought*, Prof. Max Müller now adds two more stately volumes on *The Science of Mythology*. He thus partially fills the gap in the work of his life as he had planned it many years ago, namely, "an exposition, however imperfect, of the four Sciences of Language, Mythology, Religion, and Thought, following each other in natural succession, and comprehending the whole sphere of activity of the human mind from the earliest period within the reach of

our knowledge to the present day." He had always cherished the profoundest regret at not having ever been able to do for mythology what he had been allowed to do for the other three sciences, namely, "to collect in a comprehensive form what I had written and what I still wished to say." Having been told, however, that as a defender of mythological orthodoxy he stood "quite alone, a poor Athanasius *contra mundum*," and that all his followers and supporters had deserted him, that his victorious adversaries were legion, etc., he felt it as a personal challenge which it behooved him as a representative of science and in justice to the cause he championed, to transfix. He has poised his lance, therefore, against that motley army of popular writers and dilettantes who without scholarship or the spirit of research have overrun the domain of Comparative Mythology and Folklore, and also against that increasing army of real and genuine scientists who have forsaken the older implements of Mythology and have been winning new conquests by the weapons of Ethnology. He quotes on this head the judgment of that Nestor of folklorists and ethnologists, our own Horatio Hale, who gives as the reason of the recent neglect of linguistic studies the following opinion:

"The patient toil," he writes, "and protracted mental exertion required to penetrate into the mysteries of a strange language and to acquire a knowledge profound enough to afford the means of determining the intellectual endowments of the people who speak it, are such as very few men of science have been willing to undergo."

As to the impersonal character of science and as to the irrelevance of his having been flouted as "the only champion left to defend Mythology," Prof. Max Müller, conscious of the personal nature of his plea, forestalls the possible suspicion of egotism in the following beautiful words:

"I am pleading *pro domo*, but not for myself. Scholars come and go and are "forgotten, but the road which they have opened remains, other scholars follow "in their footsteps, and though some of them retrace their steps, on the whole "there is progress. This conviction is our best reward, and gives us that real joy "in our work which merely personal motives can never supply."

Then follows a succession of kindly thrusts at his most persistent and presumptuous critics, particularly Mr. Andrew Lang, who, despite his lacking the mysterious qualifications which admit men to the magic circle of specialists, is nevertheless a conspicuous and ubiquitous figure in the book, and the object of much flattering persiflage. Following we have a catalogue of the great men who defended in the olden times and who still defend the cause which the author represents, and whose overtowering magnitude casts his pygmy opponents utterly in the shade. Interspersed throughout the book in profusion is that piquant personal gossip for which Professor Max Müller is so justly famed, and which, if administered by any less skilful hand, would go far towards disproving the author's view that "true science has nothing to do with personality."

The two bulky volumes which compose the work are divided into six chapters,

viz.: Chapter I., which is a "Retrospect" or survey of the beginnings of Mythology, its controversies, etc.; Chapter II., "On the Problems and Methods of the Science of Mythology;" Chapter III., on "The Analogical School of the Science of Mythology"; Chapter IV., "The Psychological School of Comparative Mythology"; Chapter V., on "Phonetics"; and Chapter VI., which takes up the entire second volume, on "Vedic Mythology." The chapters are well and thoughtfully arranged into short subdivisions, having headings of bold-faced type, features which, with the excellent index, dispense with a systematic reading of the work and render it easy of consultation. The work is, self-confessedly, not a systematic treatise but a collection of fragments and personal opinions on the thousand and one varied problems and controversies which the divergencies between the different schools of comparative mythology have given rise to.

Comparative mythology is, according to Max Müller, divided into three schools: (1) the etymological or genealogical school; (2) the analogical; and (3) the psychological or ethno-psychological. The first school tries to prove the common origin of myths among cognate races before their separation by showing in their language the presence of certain proper names of gods or heroes which, if tested etymologically, show substantially the same original meaning. For example, *Ζεὺς πατήρ*, "Jupiter," as compared with the Sanskrit *Dyausch-pitar*, i. e., "the bright sky as father." The second school makes use of the similarities in the characters and fates of the gods and heroes, even though their names be different, for proving their identity. The third school compares the myths of people genealogically and linguistically unconnected and chiefly of tribes on the lower and lowest stages of civilised life, finding in their coincidences the result of psychological tendencies ingrained in human nature and consequently common to all mankind. These methods are not contradictory according to our author, but have all their justification. He has chiefly worked within the "narrow limits of the genealogical or linguistic school," which, as compared with the newer ethnological school, is latterly supposed to have fallen into disrepute from its extravagances. This charge Prof. Max Müller resents, claiming that the method forged by his predecessors and *confrères* is as legitimate in its field as that which has so successfully been used by his opponents. "Each in its own sphere has done and may continue to do some real good, but they should not be mixed up together." Of his own school he claims he has never shared the prejudices and has ever been willing to take advantage of the ways of investigation of the others. His plea has a plausible and prepossessing form and is certainly fascinating reading alive with light and suggestiveness on all the points investigated. It will serve the cultured reader who is occupied with mythology, for occasional reading; and whatever its actual value from the point of view of the modern specialist, certainly coming from a man of Max Müller's learning and power, even to the initiated it will not be without powerful influence. Its gentle, aristocratic tone is fitly crowned by a dedication to the King of Sweden.

T. J. McCormack.

HABIT AND INSTINCT. By *C. Lloyd Morgan, F. G. S.* London and New York: Edward Arnold. 1896. Pages, 351.

The contents of the present work by Prof. C. Lloyd Morgan are already familiar to many Americans, as they formed the subject of the Lowell course of Lectures at Boston and of further lectures in New York, Chicago and other university centres during the early part of 1896. Some of the matter of the book has appeared in the *Fortnightly Review*, *Nature*, *Natural Science*, *The Monist*, *The Humanitarian*, *Science*, and reprints of many of the observations in *The Open Court*. As now collected, this matter forms a handsome, well printed volume having a beautifully engraved frontispiece of a group of young birds, and is divided into fifteen chapters. The first chapter treats of some Preliminary Definitions and Illustrations with special reference to the distinction between instincts and habits, as being in the one case congenital and in the other acquired. The second chapter treats of Some Habits and Instincts of Young Birds, the third of Locomotion in Young Birds, the fourth continues the Observations on Young Birds, the fifth deals with Young Mammals, the sixth with the important subject of The Relation of Consciousness to Instinctive Behavior, which lies at the basis of psychology; the seventh discusses Intelligence and the Acquisition of Habits, the eighth Imitation; the ninth, tenth, and eleventh deal respectively with The Emotions in their Relation to Instinct, Some Habits and Instincts of the Pairing Season, and Nest-Building, Incubation and Migration. The remaining four chapters, which in their general philosophic bearing are perhaps most important, are entitled, respectively, "The Relation of Organic to Mental Evolution," "Are Acquired Habits Inherited?" "Modification and Variation," and "Heredity in Man." We may refer briefly to some of their conclusions. The position of Prof. Lloyd Morgan with regard to the inheritance of acquired habits, is well known,—being a partial compromise between the Weismannian and Lamarckian views, although leaning decidedly towards the former. He says: "If pressed to summarise my own opinion on this vexed "question, I should say, first, that there is but little satisfactory and convincing "evidence in favor of transmission, but that variation does seem in some cases to "have followed the lines of adaptive modification, so as to suggest some sort of "connexion between them; secondly, that there are many instincts, relatively "definite and stable, which may fairly be regarded as directly due to natural selec-"tion, though here again, if we could accept the view that adaptive modification "marked out the lines in which congenital variation should run, our conception of "the process of their evolution would be so far simplified; thirdly, that there are "some peculiar traits, also seemingly definite and stable, which can only be attrib-"uted to the indirect effects of natural selection on the supposition that they form "part of the congenital nexus, and that they have no intrinsic tendency to varia-"tion in any particular direction; and fourthly, that, in the present state of our "knowledge, it is best to accept provisionally the view that they are thus indirectly "due to natural selection."

Nevertheless he feels that although the evidence for the transmission of acquired habits is insufficient yet some connexion between variation and modification is suggested by the facts, understanding by "variations" departures of congenital origin and by "modifications" departures which are individually acquired. He has accordingly approached this subject from a new standpoint and has sketched in outline, Chapter 14, "an hypothesis according to which acquired modification may pave the way for congenital variation without any direct transmission as such."

Prof. Lloyd Morgan does not accept Weismann's doctrine of germinal selection as recently expounded in *The Monist* though he regards it as a suggestive hypothesis; it does not follow for him that because in some cases use and disuse can have played no part therefore in no other cases has use-inheritance prevailed. He believes he can accept the facts adduced by the transmissionist and at the same time interpret them on selectionist principles. The gist of his idea is that "persistent modification through many generations, though not transmitted to the germ, nevertheless affords the opportunity for germinal variation of like nature." The modification is not inherited but from having taken place generation after generation variations in the same direction as the modifications are no longer repressed and are allowed full scope. There will arise a congenital predisposition to the modifications in question. Given the plasticity of organisms, given persistent modifications, ever increasing in adaptiveness, germinal variation will follow. "The mod-"ification *as such* is not inherited, but is the condition under which congenital "variations are favored and given time to get hold on the organism, and are thus "enabled by degrees to reach the fully adaptive level."

The conclusions regarding heredity in man are important and touch the quick of a much vexed question. They approach again to the Weismannian view as will be seen from his own words: "There is little or no evidence of individually ac-"quired habits in man becoming instinctive through heredity. Natural selection "becomes more and more subordinate in the social evolution of civilised mankind; "and it would seem probable that with this waning of the influence of natural se-"lection there has been a diminution also of human faculty. Hence there is little "or no evidence of the hereditary transmission of increments of faculty due to con-"tinued and persistent use. A discussion of heredity in man thus confirms the "inference drawn from the study of habit and instinct in some of the lower ani-"mals." And further: "If those who endeavor to apply biological conceptions to "social phenomena would only remember that the essence of natural selection is "the exclusion of the weakly, the inefficient, and the anywise unfit, from transmit-"ting their inefficiency, and the consequent hereditary increment of efficiency in "those who remain to contribute as parents to the continuation of the race, much "confusion of thought would be avoided. In this sense I contend that natural "selection is not an important factor in human progress among the civilised races "of to-day." Prof. Lloyd Morgan does not believe that the level of human intelligence is rising but only the level of the intellectual and social environment—the

stored up opportunities of intellectual and æsthetic culture. Selection without elimination involves no racial progress. He then puts this problem: "It would "seem, in fine, that if mental evolution in man be manifested rather in the pro- "gressive advance of human achievement than in progressive increment of human "faculty; if the developmental process have been transferred from the individuals "to their environment; if it be rather the intellectual and moral edifice that is un- "dergoing evolution, than the human builders that contribute in each generation a "few more stones to take a permanent place in its fabric; if there be thus no con- "clusive evidence that faculty is improving, but rather the opposite; if all this be "so, then it would seem that the ground is cut way from under the feet of those "who regard mental evolution in man as due to inherited increments of individ- "ually acquired faculty. Nay, more; if the average level be not rising, some ex- "planation must be demanded from transmissionists of this fact. For surely if "there be transmission of individually acquired increment, the average level of "faculty ought to be steadily rising."

The book, both for study and reading, is marked by charm of style, attractiveness of presentation, and soundness of philosophical view. There is a wealth of observation on animal life gathered in it, concisely and entertainingly told. All will draw intellectual edification from its perusal. T. J. McC.

VORLESUNGEN ÜBER THEORETISCHE PHYSIK. Von *H. von Helmholtz*. Band V Electromagnetische Theorie des Lichtes. Herausgegeben von Arthur König und Carl Runge. Hamburg. 1897. Pp. 370. Price, 14 Marks.

Helmholtz in his triple rôle of physiologist, physicist, and mathematician is perhaps sometimes forgotten as Helmholtz the educator. It may indeed be doubted whether any one American, dead or living, has ever furnished from the ranks of his own students so many investigators and instructors in physics for American institutions as has Helmholtz.

For a full quarter of a century, the royal university of Berlin was the attracting centre for Americans in search of opportunities in physics, mathematical or experimental. It was there, under the kindly eye and word of the master, that life-long inspiration came to many a student. The volume under review, therefore, is not without a peculiar personal interest for many of its English-speaking readers.

Forming, as it does, the fifth in a series of six volumes, it is nevertheless the first to appear, the lectures having been recorded in stenographic notes by a student during the last semester of their delivery. While the *Electromagnetic Theory of Light* stands as the title of the lectures, they cover really the whole ground of modern optics, both geometrical and physical. Parts III., IV., and V., treating of spherical waves, diffraction and geometrical optics, respectively, would stand intact on *any* wave-theory of light, being questions of kinematics, not of kinetics. It is when the real nature of luminous disturbances is considered, in Parts I., II., and

VI., that the electromagnetic theory is employed, and employed with marvellous lucidity.

It will be remembered that Maxwell, in 1865, sent to the Royal Society his prediction that light-waves would be found to be electric waves, travelling in the ether of transparent substances, and that the speed of light, in any given medium, would be found to depend upon the electric and magnetic constants of that medium. But it was not until the autumn of 1888 that Hertz, the favorite pupil of Helmholtz, succeeded in actually producing these electric waves, in measuring their speed, in reflecting, refracting, and polarising them; succeeded, in short, in proving *experimentally* the identity of light-waves and electric-waves. This investigation of Hertz was undertaken in response to a prize question set by Helmholtz for the Berlin Academy. In a very true sense, therefore, Helmholtz is one of the founders of the electromagnetic theory of light: and the volume before us is one in which a creator describes his own work; especially is this the case in the chapters on geometrical optics and dispersion.

To one of philosophic bent, no more instructive chapter in the history of physical science is to be found than that in which a great field of learning—light—is swallowed up, as a special case, in another great field—electricity. It forms a long stride toward a unitary view of nature, toward the goal of modern physics.

Each of the various parts of the subject which Helmholtz here handles have been discussed in various treatises, English and German, and, indeed, the whole subject is touched upon in certain compendiums of physics. But nowhere has there ever appeared a treatment at once so thorough, so elegant, and so exceedingly clear, as that under review. The mathematics which appear are not introduced as exercises in analysis, rather as tools in a master's hand. Each mathematical result receives a distinct physical interpretation. The word "theory," from its first appearance on the title-page to the end of the book, is employed only in its best sense —its original sense—to indicate not the hazy guess of a vivid imagination, but an attempt at a comprehensive survey and a concise description of facts.

A brief summary of the contents of the volume is the following. Our notions concerning the nature of light have been arrived at through at least four steps. First, the emission-theory of Empedocles in which the eye, as well as the object seen, emits the light. Second, the corpuscular theory of Newton, in which the self-luminous body is the sole source of emission. Third, the elastic-solid wave-theory of Fresnel. Fourth, the electromagnetic wave-theory of Maxwell.

It is to a complete description of optical phenomena in terms of Maxwell's idea that this first purely didactic volume of Helmholtz is devoted.

One hundred pages are first given to a study of the properties of electric waves. The beautiful parallel treatment of electric and magnetic quantities is preserved throughout. A clear grasp of the general phenomena of electricity is here demanded of the intelligent reader. The next hundred pages cover a rigid mathematical discussion of diffraction. It is here that the author explains what is, at once, the par-

adox and the *crux* of optical science, viz., the rectilinear propagation of light, and the fact that light can and does shine around a corner. The starting-point of this discussion is a remarkable generalisation of Green's Theorem—itself the most powerful theorem in mathematical physics—to include four independent variables, time being the one added to the usual three space-coordinates.

Geometrical optics is the subject of the third hundred pages, a very elegant chapter.

The remainder of the book goes to dispersion and polarisation, treated in terms of the electromagnetic theory. Much of the subject matter is the result of Helmholtz's own investigations concerning the mysterious connexion between ether and matter.

The appearance of these six posthumous volumes of mathematical physics, in addition to three volumes of *Scientific Papers* and two epoch-making treatises, cannot be contemplated without amazement at the changes which the genius of this one man has wrought on the face of modern science.

The ease with which he lays aside his seven-leagued boots and adapts himself to the intellectual wants of his hearers makes him a brilliant example to all teachers. While as an instructor in the elementary parts of his subject he was never a striking success, to investigators the mere mention of his name is an inspiration.

HENRY CREW.

OSTWALD'S KLASSIKER DER EXAKTEN WISSENSCHAFTEN. Vier Abhandlungen über die Elektricität und den Magnetismus (No. 13.) Von *A. Coulomb*. Pages, 88. Price, M. 1.80. Zwei Abhandlungen über die Wärme. (No. 40.) Von *Lavoisier* und *Laplace*. Pages, 74. Price, M. 1.20. Anmerkungen und Zusätze zur Entwerfung der Land- und Himmelscharten. (No. 54.) Von *J. H. Lambert*. Pages, 95. Price, M. 1.60. Ueber Kartenprojection. (No. 55.) Von *Lagrange* und *Gauss*. Pages, 101. Price, M. 1.60. Leipsic: W. Engelmann.

The four essays of Coulomb here reprinted are the most important of his seven fundamental memoirs on the laws of electricity and magnetism. The first two are devoted to the proof that the repulsions and attractions of electrified and magnetised bodies take place according to the law of the inverse squares, the third deals with the loss of electricity in such action, the fourth proves that the electric charge is distributed over bodies by its own repulsion, and that when in equilibrium it is always at the surface. The results form the basis of the entire mathematical treatment of magnetic and electrostatic phenomena as it has taken shape in the modern theory of potential, and until the researches of Faraday formed the sole basis. Revolution after revolution has taken place since then in electrical *theory*, but the *facts* established by Coulomb remain unchanged, and his investigations, therefore may be regarded as an exemplar of scientific procedure.

The memoirs of Lavoisier and Laplace are extremely important as marking

the starting-point of the investigations which led up to the thermal theories of J.R. Mayer, Krönig, Clausius, and others, and in view of the frequent references to them in books on the history of the conservation of energy, it is well that they can be obtained in a separate and cheap form.

Lambert's researches are the first general investigations on cartography and form collaterally valuable contributions to pure mathematics. The thread of investigation in this field was continued by Lagrange, who, while still generalising the methods of treatment, aimed, as was always his wont, at obtaining practically useful results. With Gauss, emphasis was principally laid upon the abstract mathematical point of view.

The publication of this series is a valuable work, and all students should possess the Classics which relate to their departments. *μ.*

ELEMENTS OF THEORETICAL PHYSICS. By *Dr. C. Christiansen*, Professor of Physics in the University of Copenhagen. Translated into English by *W. F. Magie, Ph. D.*, Professor of Physics in Princeton University. London and New York: The Macmillan Co. 1897. Pages, 339. Price, $3.25.

Of the flood of recent text-books on physics the treatise of Professor Christiansen has stood high in pedagogical favor. It exists at least in a German translation and has now been Englished by Prof. W. F. Magie of Princeton University. The book is not an elementary one, and requires considerable knowledge of mathematics, but it is condensed and treats the main problems of theoretical physics in a concise and direct manner. There are fourteen chapters in all, entitled as follows: "General Theory of Motion," "The Theory of Elasticity," "Equilibrium of Fluids," "Motion of Fluids," "Internal Friction," "Capillarity," "Electrostatics," "Magnetism," "Electro-Magnetism," "Induction," "Electrical Oscillations," "Refraction of Light in Isotropic and Transparent Bodies," "Thermodynamics," and "Conduction of Heat." American text-books of physics, having a different purpose in view, devote the greater part of their space to the discussion of methods and instruments, so that a treatise like Christiansen's which is almost totally abstract and mathematical will find the field virtually unoccupied. The translation is good, and the publishers are to be congratulated upon the excellent mechanical makeup of the book. *μκρκ.*

UEBER DEN URSTOFF UND SEINE ENERGIE. I. Theil. Eine physikalish-chemische Untersuchung über die theoretische Bedeutung der Gesetze von Dulong-Petit und Kopp auf der Grundlage einer kinetischen Theorie des festen Aggregatzustandes. Von *Dr. Phil. H. Keller*. Leipsic: B. G. Teubner. 1896. Pages, 58. Price, M. 2.

The problem of the *prima materia* has occupied philosophical brains for more than two thousand years, and after having been laid to rest by modern philosophical criticism as the vision of a metaphysical dream, has now again come to the fore

through the researches of physical chemistry. Both Meyer and Ostwald have expressed their presentiment as to its existence, and the latter has said that if the properties of elements are found to be functions of atomic weights, we are impelled to seek in the latter the cause of the former, and so the notion of a homogeneous primitive matter whose different agglomerated states make up the differences of the elements is readily suggested. He admits that the hypotheses underlying this suggestion are not perfectly established, but the whole corresponds to the present endeavor of science to derive all differences from a fundamental underlying unity. The same problem has occupied Dr. Keller, but where Ostwald has approached it from considerations touching the causes of the periodic law, and from Prout's hypothesis, Dr. Keller has emphasised a different factor which he believes has never been cited in support of a probable existence of a homogeneous primitive matter, namely, the law of Dulong and Petit. It is beyond our purpose here to refer to more than the philosophical trend of Dr. Keller's little paper. The treatment is mathematical and will appeal to specialists only. The author is inclined to the opinion that the universal ether and primitive matter are the same, the universal ether being uncondensed primitive matter and constituting the bond which links the earth to the sun, etc. *μκρκ.*

THE PHASE RULE. By *Wilder D. Bancroft.* Large 8vo, viii+255 pages. The Journal of Physical Chemistry: Ithaca, New York. Price, $3.00.

In the last ten years great advances have been made in that part of science which applies physical methods to the elucidation of chemical problems. While the most brilliant achievements cluster about the "Theory of Solutions," the "Dissociation Hypothesis," and the molecular structure of liquids, important results have been obtained by the use of Gibb's Phase Rule and Le Chatelier's Theorem.

By a "phase" is meant a portion of matter that is chemically as well as physically homogeneous, and the Phase Rule states that the maximum number of phases possible in any given system is two more than the number of components, a component being defined as a substance of independently variable concentration. The Phase Rule having reference only to states of equilibrium, in case any alteration in a system supervenes and we want to know its direction, we have recourse to Le Chatelier's Theorem, which says that changes in the factors of equilibrium (temperature, pressure) due to external influences bring about reverse changes within the system.

The book before us is an attempt to treat the subject of qualitative equilibrium by the application of the Phase Rule and Le Chatelier's Theorem. Mathematical developments are excluded, probably with a view towards rendering the work the more acceptable to general chemists, most of whom have but a meagre mathematical equipment; graphical representations are, however, used in profusion.

After defining terms in the first chapter, the author passes to the consideration of systems made up of one component and hence presenting in maximo three

phases, solid, liquid, gaseous. Then systems containing two and three components are taken up and classified and treated according to the nature of the phases. Systems consisting of more than three components having as yet received but little experimental attention, the general theory of systems of four components together with such data as are at hand is given in the concluding chapter.

The author is full of enthusiasm for his subject, and has collected together about all that has been done along this line. Nevertheless, in some of his criticisms and discussions we might wish for greater breadth of view, and in certain points that are original with himself, more clearness.

All in all, the book is to be welcomed as a valuable aid in the study of the phenomena lying between the domains of Physics and Chemistry, and the reader will find in it novel and striking ideas about many things often regarded as trite and common. One point is especially worthy of note. Although the subject-matter pertains to chemistry and physics, nothing is said about atoms or molecules; the treatment is general and quite free from such suppositions the usefulness of which we are beginning to suspect we have in a measure outlived. C. E. L.

GRUNDZÜGE EINER THERMODYNAMISCHEN THEORIE ELEKTROCHEMISCHER KRÄFTE. By *Dr. Alfred H. Bucherer*. Freiberg: Craz & Gerlach (Joh. Stettner). 1897. Pages, 144. Price, M. 4.

This little book is in main a criticism of the electrolytic dissociation theory by Arrhenius, and Nernst's theory of electromotive force; it also contains some animadversions on the modern theories of solutions.

The author has had great difficulty, he says, in getting a clear conception of the nature of ions, and thinks that "those phenomena, to which Arrhenius's theory "owes its origin, that is, abnormal lowering of freezing point and abnormal osmotic "pressures, find a more natural explanation in the assumption of an association of "the dissolved substance with the solvent." This hypothesis of association is virtually a modification of the "Hydrate Theory."

The first three chapters of the book are devoted to the consideration of the Law of the Conservation of Energy and the Fundamental Principles of Thermodynamics. Emphasis is laid on the division of energy into two factors,—the intensity and the capacity factor.

A brief exposition of the ways in which thermodynamics is applied to electrochemistry, and of the various views on the nature of electrolytic conductivity leads up to the criticism of the recent views on these subjects and of the equations established by Nernst permitting of the calculation of electromotive force from data on temperature, osmotic pressure, and tension of solution. Now it must be admitted by even the most ardent partisan of these modern theories that there are some things about them that need clearing up; and whether we think the author has helped matters much or not, he will by his attack on their weak points at least have called the attention of others to them, and so assisted in their elucidation.

Particular stress throughout the book is laid upon the law of mass action, an independent deduction of which the author gives (pp. 68–72), adding a criticism of Nernst's deduction of the same law.

After a discussion of concentration cells and temperature coefficients, the author considers in separate chapters the influence on electromotive force that pressure, magnetism, gravity, capillarity, and diffusion exert. The concluding chapter treats of thermo-electricity, the original feature of the treatment being the application of the vapor tensions of the metals to the calculation of the electromotive force.

C. E. L.

OUTLINES OF PSYCHOLOGY. By *Wilhelm Wundt*. Translated with the Co-operation of the Author by *Charles Hubbard Judd, Ph. D.*, Instructor in Wesleyan University. Leipsic: Wilhelm Engelmann. New York: Gustav E. Stechert. 1897. Pages, 342.

The English translation of Professor Wundt's new *Outlines of Psychology* appeared shortly after the German work, having been translated with the co-operation of the author by Dr. Charles Hubbard Judd of Wesleyan University, and having been published by the same firm as the original, namely, Wilhelm Engelmann of Leipsic. The book was made in Germany and combines certain excellent features of both American and German books, good paper, clear print, flexible binding and an index. As a treatise the book affords "a systematic survey of the fundamentally important results and doctrines of modern psychology," viewed as a science by itself, having its own independent aims and proper coherency, and in this manner is differentiated from the author's *Grundzüge*, which treated psychology as a branch of the natural sciences, particularly physiology, and from his *Lectures on Human and Animal Psychology*, which dealt with the subject popularly and in its philosophical aspects. The ideas which lie at the basis of the treatment of the present work have left a distinctive impress on modern psychology and are known wherever Wundt is known. In their present concise and systematic formulation they constitute an introduction to the study of psychology at the hands of one of its greatest masters. Nevertheless there is something harsh and rigid in its treatment to the un-German mind; the terms, despite long use are still strange and unfamiliar, unsympathetic, and remote from our feeling. The translator who has done his work carefully and conscientiously has appended a glossary of the main German and English terms at the end of the book, a very valuable practice in the reviewer's opinion, to the need of which he called attention some time ago in *The Monist*. Alternative renderings might be suggested in some places, for it is not always necessary to adhere rigorously to a single rendering of a term in a scientific book. Words are used with freedom and take different shades from their context. The rendering of *angeboren* by "connate" might be supplemented by "innate,' "native," "congenital," and "inborn." *Hülfsbegriff* is rendered by "supplementary concept" where "auxiliary concept" might perhaps be better. "Percep-

tion" as a translation of *Anschauung* and its derivatives might be varied. "Motive" would sometimes be preferable to "reason for action" as a translation for *Beweggrund*. "Main-spring" is a good and common translation of *Triebfeder*. "Proposition" is given for *Verhältniss* and seems to be a misprint for "proportion" or "ratio." *Vorstellung*, although actually and originally a German translation of "idea," might frequently be appropriately rendered by "percept," which was suggested by Max Müller. It seems odd to say "an auditory idea," at least until one gets used to it, although the German equivalent is almost, but not quite, as odd. Some authors have rendered *Völkerpsychologie* by "ethnic psychology" or "ethno-psychology," although Mr. Judd's term "social psychology" better expresses some phases of the notion. Upon the whole the glossary is good and the practice should be continued. For the most difficult words, however, a few-page references might be given to the text, so that critics could judge of the admissibility of alternative renderings. T. J. McC.

BIOLOGICAL LECTURES DELIVERED AT THE MARINE BIOLOGICAL LABORATORY OF WOOD'S HOLL, IN THE SUMMER SESSION OF 1895. Boston and London: Ginn & Co. 1896. Pages, 188.

We have already given an account of the purpose of the work of the Marine Biological Laboratory of Wood's Holl and of the biological lectures which are there delivered and yearly gathered into the form of a substantial volume, so that we have only to append here the titles of the eleven lectures which make up the volume for the summer session of 1895. They are as follows: 1. Infection and Intoxication, by Simon Flexner; 2. Immunity, by George M. Sternberg; 3. A Student's Reminiscences of Huxley, by Henry Fairfield Osborn; 4. Palæontology as a Morphological Discipline, by W. B. Scott; 5. Explanations, or How Phenomena Are Interpreted, by A. E. Dolbear; 6. Known Relations Between Mind and Matter, A. E. Dolbear; 7. On the Physical Basis of Animal Phosphorescence, by S. Watasé; 8. The Primary Segmentation of the Vertebrate Head, by William A. Locy; 9. The Segmentation of the Head, by J. S. Kingsley; 10. Bibliography: A Study of Resources, by Charles Sedgwick Minot; and 11. The Transformation of Sporophyllary to Vegetative Organs, by George F. Atkinson. These are all important investigations by recognised masters of American science, and although passages from some of them have already appeared in the periodicals, it is yet well that they have been brought into an independent volume. They will well repay careful reading and study. *p.*

ROUSSEAU UND SEINE PHILOSOPHIE. Von *Harald Höffding*, Professor der Philosophie an der Universität Kopenhagen. (Frommann's Klassiker der Philosophie. IV.). Stuttgart: Frommanns. 1897. Pages, 158. Price, M. 1.75.

Rousseau is a man of contradictions. To speak of Rousseau's philosophy is in a certain sense a misnomer, for Rousseau has no philosophy. He always follows the

impulses of his sentiments, and this is the reason why he could be so extremely self-contradictory. His conversion to Roman Catholicism was a matter of sentiment, and so were his relations to Madame de Warens; so his whole life. He is commonly supposed to be one of the leaders of liberal thought and the forerunner of the Revolution, and so he is, but he was at the same time one of the most reactionary men that ever lived, and the reactionary influence of his books will be felt as long as they are read. The question whether the renaissance of science and arts had contributed to purify and improve morals was answered by him in the negative. He saw in culture and civilisation an aberration from nature, and his saying "Back to Nature" meant to him an abandonment of refinement of all kinds. He was so bitter in his denunciations of science, art, and civilisation in general, so fervent in his appeals to return to the primitive state of nature, that Voltaire is reported to have said, after the perusal of his book, that he felt like crawling on all fours. Rousseau is in this respect a genuine type of the impulsive liberal who for the sake of opposition would oppose everything that is established and exercises a dominant influence upon our present life. He forms an exact parallel to the agnostic who for the sake of opposing the gnosticism of traditional religion, would condemn any kind of gnosis and proclaim the dogma of the absolute insolubility of all fundamental questions of philosophy. Nevertheless, Rousseau is a prominent man who exercised a reactionary influence because the civilisation of his days and of his country was not the right civilisation. It was artificial and unnatural.

The most important part of Rousseau's philosophy is perhaps his ideas on education, but here again we have the contradiction that he, the man of the people, the representative of the poor, believes that education is for the rich alone. The poor need no education, for it is impossible for them to acquire an education. Nevertheless, in an educational line too, Rosseau has accomplished a great work, not only because his *Emile* contains many most valuable suggestions for the education of children, but also because he called attention to a great number of malpractices in the raising of children. As a practical educator Rousseau proved incapable, but his theories contain germs of truth which proved useful, although his whole work is unsystematic and contains tendencies that are against the spirit of progress. While the study of Rousseau's works will prove very valuable to the practical educator on account of the many suggestions which his writings contain, he will nevertheless fail to satisfy the present generation, at least here in America, because his very sentiments are contrary to the progressive spirit of to-day.

Professor Höffding's sketch is a simple exposition of Rousseau's career and his life's work. He defines the type of Rosseau's cast of mind, and portrays his personality as it developed in the history of his life. He recognises the high ideal aspirations of his fervid sentiments, but at the same time points out the restrictions which limited him. It is interesting to see that the same man who deemed it unnecessary to have the poor educated, devoted very little space to the education of women. His views on this subject are decidedly French. An educated woman or

la femme bel-esprit is disgusting to him. "*La Femme bel-esprit*," he says, "is a plague to her husband, to her children, to her friends, in brief to all." The education of woman must be subject to the one idea that she is to become wife and mother. Her main virtue should be placidity. An independent, intellectual, or religious education is neither necessary nor possible, for a woman's reason is practical. She has a sense for details and not for principles. The faith of woman is belief in authority. As a girl she should have the religion of her mother, and as a wife the religion of her husband, and yet Rousseau believes (as he himself was practically governed by Madame de Warens) that woman has a natural talent for governing man. The rôle of the wife consists in her placidity, in her adaptiveness, in her obedience. Her orders consist in caresses, her threats in tears. She should dominate the house in the same way that the minister rules the State, that is to say, she must give a turn to the situation so that whatever she wants will be commanded.

Rousseau happily did not speak the last word in matters of education. Professor Höffding rightly says: "Pestalozzi carried the work into the province where "Rousseau failed to accomplish anything. Moved by a zealous compassion for the "intellectual emergencies for the great mass of the people, he applied some of "Rousseau's educational principles to the popular schools. Through Pestalozzi "and Basedon, the pedagogical ideas of Rousseau were applied generally to the "educational methods of the succeeding generation. And thus," concludes Pro-"fessor Höffding, "the well which Rousseau had dug contained a greater wealth "than he himself had hoped for." P. C.

DYNAMIC SOCIOLOGY OR APPLIED SOCIAL SCIENCE. As Based Upon Statical Sociology and the Less Complex Sciences. By *Lester F. Ward*. Two Volumes. Second Edition. New York: A. Appleton & Co. 1897. Pages, 1432.

Mr. Lester F. Ward is to be congratulated upon the appearance of the second edition of his *Dynamic Sociology*, a work whose merits are widely recognised and familiar to all students of sociology. He has incorporated in the Preface to the present edition a sketch of the interesting history and vicissitudes of his work which has been accorded the signal distinction of having been prohibited by the Russian censor and of having been burned in its Russian edition, not from any intrinsic heresy, so far as the author can see, but from the resemblance between its title and the word "dynamite," or most probably from its expression of liberal thought in politics and in education. First published in 1883, when the word "sociology" was rarely spoken, it has witnessed the rise of its science from dim obscurity to a plane where it has become one of the most popular and most widely cultivated branches of study. Mr. Ward's work is one of immense learning and great clearness of expression, and should find accordingly a wide circle of appreciative readers. *u.*

HERBERT SPENCER. Von *Otto Gaupp*. Frommanns Klassiker der Philosophie, V. Stuttgart. 1897. Fr. Frommanns Verlag. Price, M. 1.75.

The author complains that the professional philosophers of Germany do not give to Mr. Herbert Spencer the place he deserves. He is known among them as the philosopher of the unknowable, not as the philosopher of evolution. Indeed there are many evolutionists in Germany who do not even know of the claims of Mr. Spencer's disciples that he was the first who universally applied the principles of evolution—a claim which can be made only by those who are utterly ignorant of the history of the idea of evolution and know nothing of Wolff, Lamarck, Treviranus, Karl von Baer, and the other pre-Darwinian evolutionists Herr Gaupp characterises Mr. Spencer as an ideal philosopher after his own fashion who hates the *Treibhausmethoden* (p. 14) of the German educational system, is unattentive and lazy at school (p. 13), yet grows up to be at least relatively *ein kräftiger und gesunder Bursche*. The main sources of the pamphlet are Spencer's own works and Mr. Youmans's writings on Spencer. The treatment is that of an admirer; popular but uncritical. κρς.

LA FILOSOFIA SCIENTIFICA DEL DIRITTO IN INGHILTERRA. Part I., From Bacon to Hume. By *Dr. Giacomo Laviosa*. Turin: Carlo Clausen. 1897. Pp. 850. Price, 10 Lire.

This volume contains an introductory chapter on the two currents of modern thought in ethico-juridical philosophy, namely, the Baconian and the Cartesian. The author accepts the Baconian method and proceeds to expound and criticise English philosophy in so far as it relates to his subject from Bacon to Hume, including Hobbes, Locke, Milton, Shaftesbury, Butler, Hutcheson, and Mandeville. The purpose of the book, as expressed by the author, is to make a modest contribution to the critical revision of English doctrines in regard to the scientific philosophy of law. Such a revision the author believes is necessary to establish a solid basis for the construction of the science. "The historical study of this series of authors "constitutes the best preparation for the critical study of the aggregate of ideas "which has resulted from their writings. This preparatory study forms the precise "object of the present work" (p. 95). The aim of the book is thus seen to be a worthy one. Without such a study as is here made, it is impossible to estimate the value of ethico-juridical ideas. The author's style is easy and his exposition clear. He shows a wide acquaintance not only with English thought, but also with French and German. I. W. H.

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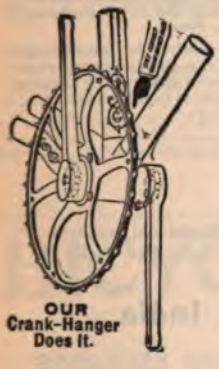

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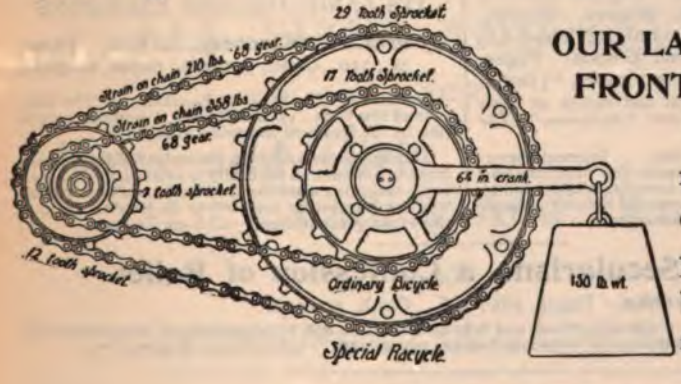

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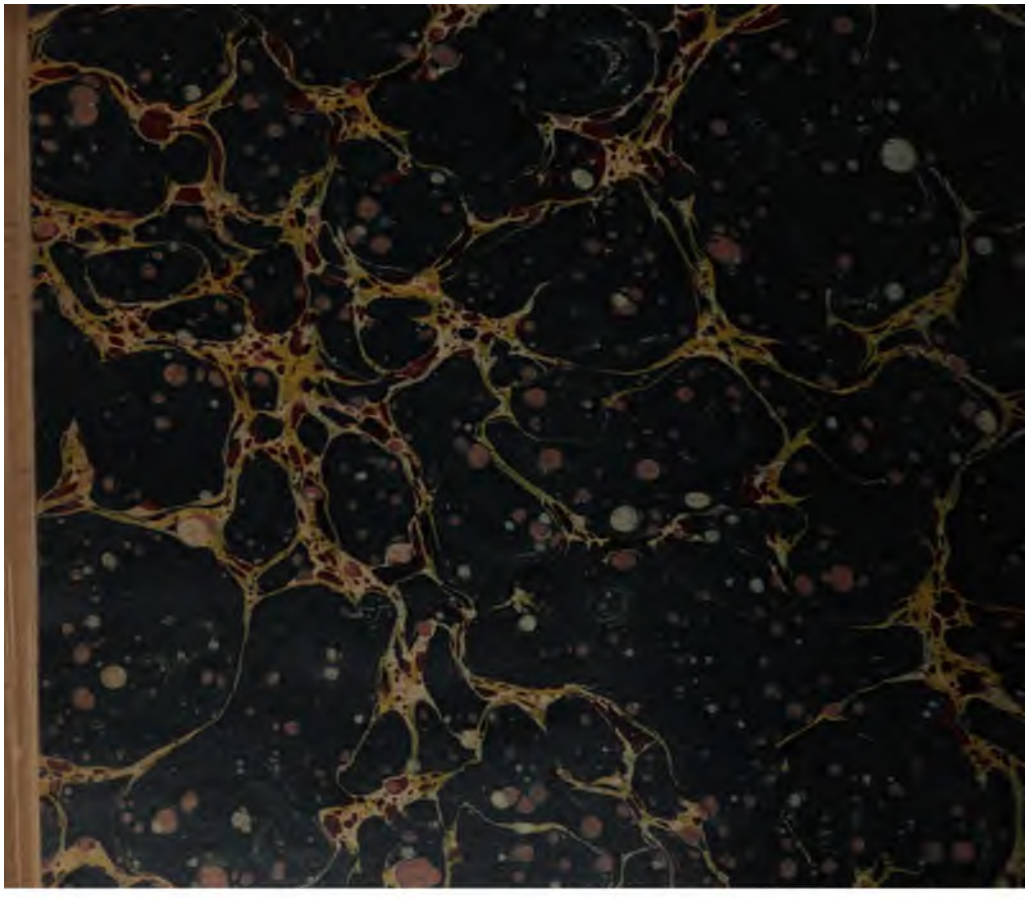

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